A TRAINERS' MANUAL FOR INTEGRATED COASTAL MANAGEMENT CAPACITY DEVELOPMENT

Produced by the Integrated Coastal Zone Management and Training (ICZOMAT) Project

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The material contained in the manual benefited from all those who have contributed to the ICZOMAT project:

Cover pictures:

Top left	Coastal erosion, North Chennai, India.
Top right	Broken and ruptured industrial outflow, North Chennai, India.
Bottom left	Chinese fishing nets, Cochin, India.
Bottom right	Urban beach front, Mumbai, India.

Content

Content

The coast presents particular challenges that are of concern to policy makers. There are distinctive dimensions associated with change processes, risk and the dynamics of human agency especially with regard to access to resources. These impact on the vulnerability of large populations living in coastal areas and are thus of concern for policy and management. While the issues in coastal areas are distinctive and complex, they are not unmanageable. This manual emphasises the need for management solutions to be integrated and not drawn up along sectoral lines. This requires a serious engagement with the reality of people who live on the coast and the set of issues that arise.

Any programme that is attempting to develop capacity and capability for managing coastal areas needs to reflect this reality. The *Integrated Coastal Zone Management and Training* (ICZOMAT) project - funded by the Department for International Development, Government of UK and run under the support of the Ministry of Environment and Forests (MoEF), Government of India - attempted to address this. ICZOMAT was instigated in order to explore the design for a training programme that supported the development of Integrated Coastal Management (ICM) in India and the professional development of individuals. Key to achieving this in a training context is the use of a case study based methodology.

This manual describes the training process that emerged from the project and is for trainers who are involved in the training of individuals who play a role in coastal management. These individuals may be:

- government officers from a range of departments with interests which overlap with the coastal zone,

- scientists involved in studying coastal resources with a view to informing coastal policy and management interventions,

- members of civil society organisations representing particular interest groups on the coast, and/or

- politicians who are involved in making decisions that impact on coastal resources and populations.

The manual is focused primarily on the needs of trainers. It is concerned with an approach to training and capacity development for coastal management that follows good practice for education and professional training. The content outlined in the manual encourages participants to develop an approach to coastal policy formulation and management that promotes 'joined-up' thinking, and elaborates the way such skills may be developed. It assists in enabling people who make policy decisions and management decisions to gain knowledge and skills that incorporate an analysis that does not make particular groups (e.g. the poor) worse off through attempts to manage coastal resources. The approach seeks to inculcate – in training teams (and thus course participants) – a greater sense of awareness about the complex of interactions between humans and their environment and in particular the dimensions of the poverty-environment nexus. It emphasises the need to value contributions from different scientific and technological disciplines, which can form a basis to moving forward on practical

options for the mitigation of problems on the coast.

Ultimately management of the coastal zone is about managing the behaviour of various categories of people who affect the coastal zone and it is around the focus of people that coastal management has the potential to be integrated. ICM presents an opportunity – an entry point – to further develop the functional linkages within and between national, district and local government agencies and the structures of governance in coastal areas. Through a process that identifies stakeholders, and seeks to understand the dimensions of their interests, coastal managers seek to gain understanding of the context in which they operate. This enables individual managers to comprehend where their decisions are located in the overall policy and management structure.

The training methodology outlined in the manual covers a programme for Training of Trainers and a Short Course in ICM. The approach in both promotes a training style that supports, and is focussed on, the learning outcomes for an integrated approach to coastal management. The training curricula described is designed to encourage communication and discussion between individuals from different disciplinary backgrounds through the adoption of a framework around which analysis can be orientated. The training seeks to make the basics of other disciplines comprehensible to a non-specialist so that he/she can engage in a dialogue with specialists in a coastal management context.

Outline of "A Trainers Manual for Integrated Coastal Management Capacity Development"

The manual text provides guidelines for an approach to ICM, and the development, operation and provision of a capacity building programme that can assist in the strengthening of approaches to ICM.

Chapter 1 introduces the concept of ICM as an instrument to support sustainable development of coastal zones, considers the need for ICM in the South and South East Asian region and the requirements for ICM capacity building in the region.

Chapter 2 provides a background and rationale for the training methods used in this manual and introduces a framework and supporting tools for training in ICM that underpins the training approach.

Chapter 3 gives an overview for the organisational and management needs for the implementation of a capacity building programme for ICM.

Chapter 4 outlines the Training of Trainers programme including detailed outlines for eight sessions that make up the programme.

Chapter 5 provides detailed guidance to the delivery of the short course programme including suggestions for the content of 13 individual short course sessions, the conduct of fieldwork and a participant's project report with guidance for the use of the framework and the supporting tools.

Introduction

National and international development discourse places increasing emphasis on the sustainable use of natural resources and on poverty elimination. The relationship between these two requirements of sustainable development needs to be examined in integrated coastal management as there is a possibility that increased focus on sustainable management of resources can have negative impacts on the poor. The challenge for informed coastal policy in developing countries is to incorporate understanding of the relationship between natural resource management and poverty reduction.

Policy processes are often complex and coexist with an inadequately integrated model of coastal processes. This compounds the difficulties associated with attempts at managing natural resource systems in coastal areas. There is an absence of tools or models to understand and integrate the diversity of sectoral information that is associated with the array of problems that are associated with managing natural resource systems. This means that the adoption of a process for planning and management is required, which is adaptive and able to change as new information and experience is incorporated.

Unfortunately, despite the growing recognition of the strategic value of coastal resources worldwide, coastal planning and management is largely dominated by sectoral approaches which can inherently favour single purpose usage. As such these sectoral approaches tend to under emphasise the value of incorporating other sectors into their analysis. Undervaluing the long-term optimal utilization of coastal goods and services is contrary to the objectives of sustainable development.

The coastal zone is one of intense and dynamic relationships amongst the elements of the natural environment and its ecosystems. It is subject to societal demands for space and natural resources, and to external natural and human influences. Very often, societal demands outpace the capacity of the coastal zone to provide the desired goods and services. If unchecked, they lead to an excessive and unsustainable use of fisheries and other renewable resources; exhaustion of minerals and other non-renewable resources; degradation of environmental quality and health of coastal ecosystem; and potentially hazardous consequences to human health and property. Integrated Coastal Management (ICM) has been identified by many nations as the most appropriate process for determining the combination of outputs and services that are produced in order to ensure sustainable use of the resources. To be effective, ICM plans should acknowledge the following substantive principles of sustainable development:

1. That development is necessary for the satisfaction of basic human needs and aspirations.

2. That ecological integrity should be maintained within the limits of ecological carrying capacity.

3. That attention to equity and social justice must be applied in relation to the per capita use of resources within and between nations and generations.

4. That while government regulations are necessary to guide the private and cor-

porate sectors, public participation and involvement in decision making is necessary in promoting prudent and environmentally sound use of the natural resources.

The UN Conference on Environment and Development (UNCED) emphasised these issues in Chapter 17 of Agenda 21, and expressed an urgent need for coastal states to develop capabilities for ICM for the purpose of addressing current and long-term coastal resource use and environmental management issues.

Defining Integrated Coastal Management

A definition for *Integrated Coastal Management* (ICM), which has been reiterated in nearly all subsequent writings, was given by the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) in 1996 (GESAMP, 1996):

ICM is a dynamic and continuous process by which progress towards sustainable use and development of coastal areas may be achieved.

While this statement is often quoted and referred to it, in itself, is fairly vacuous. For policy and management purposes it needs to be unpacked and fleshed out to be useful. Significantly therefore, we need to make explicit in this definition that there is an intention that ICM should:

- Improve the quality of life of human communities who depend on coastal resources while maintaining the biological diversity and productivity of coastal ecosystems,

- include a concept of holistic management whereby the ICM process must in-

tegrate administrative with community structures, science with management, and sectoral with public interests, and

- provide a mechanism for the management of both resources and resource users of the coastal zone.

In the context of this manual, the term *Integrated Coastal Management*, rather than *Integrated Coastal Zone* (or *Area*) *Management,* is used. This is because the training framework seeks to develop capability to engage in a process for approaching the management of issues, activities and uses that originate from the coast in the broadest sense. Uses of terms such as 'Zone' or 'Area' reflect notions of boundaries in time and space, as well as legal and administrative definitions. Coastal processes operate on a wide range of scales which need to be appreciated by the course trainers and participants. Emphasising this shortcuts arbitrary discussion regarding what constitutes the coastal zone.

Management of the coastal zone requires an input of knowledge and an understanding of the dynamic processes of natural and social systems. In order to understand how problems arise, and why they are important, the natural sciences are vital to understanding ecosystem function and the social sciences are essential for elucidating the interplay with the human dimensions that place demands on the system. This integration enables more appropriate solutions to be found.

Herein lays the dilemma and challenge for ICM because the process that eventually leads to options that inform decision makers has to contend with a partnership of sci-

entists and managers who have different perspectives, imperatives and approaches to the solution of problems. To compound this challenge, managers must draw their solutions from a community of scientists, who have widely differing perspectives of, and also methodologies for studying, the coastal zone dependent on their discipline.

The context for ICM

The world population is projected to grow to 8 billion by 2025 with the greatest growth predicted in the developing world and the highest in Asia. More than half of the World's population live within 60km of the shoreline and this figure could rise to over three quarters by the year 2025. This pace of change in human population, and associated demands for economic growth and competition for resources, have created environmental and social costs that increasingly lead to environmental and societal degradation that outweigh the benefits of development and modernisation.

For communities that live in the coastal zone sustainable provision of goods and services from the environment become threatened by one or more of the following three interrelated conditions:

- **Over-exploitation** of renewable resources, either directly by harvesting or by the destruction or modification of habitats and disruption of predator/prey and other ecological relationships,

- **Conflicts** that arise where several human activities that depend on the same area and/or resource are incompatible, and

- **Insidious damage** that may result from cumulative impacts of different practices, including loss of biological productivity and diversity.

Coastal and marine environments are particularly vulnerable to over-exploitation because they include large areas traditionally considered to be "commons" where there has been widespread degradation. Most texts describe poor people and their needs at the centre of the problem and centre of the solutions. However, the coastal problem is not simply one of the poor overexploiting resources to improve their economic position. The coastal zone often includes areas where a diversity of incompatible activities from a plethora of users competes for limited space and resources. Often, in fact, the profits and benefits of many of these resources – fish, oil, beaches etc. – are confined to the wealthy and often politically powerful interests who control them. This can lead to costs of unsustainable practices being transferred to communities least equipped to bear the burden.

International Development Targets are focussed on the dual goals of sustainable development ("*development which meets the needs of the present without compromising our ability to meet those of the future*") and a reversal in current trends of environmental resource loss. This cannot be achieved without effective management of the environment that pays equal attention given to the three social, economic and environmental pillars of sustainable development. The challenge on both a national and micro level is to balance the desire of communities for increased economic welfare for current and future generations with the need to maintain levels of ecological, economic and social capital that ensures resilience in the long term. Given

this, the requirement for management of coastal resources is to trade-off development goals relating to production, conservation and distribution of benefits in a manner that balances short-term development needs against long-term sustainability of ecosystems, habitats, resources and communities. Therefore, ICM must be an implicitly holistic process that integrates understanding of the social, economic and environmental processes of the coastal zone. It needs to construct solutions that are focussed on managing the range of activities taking place, rather than solutions that only tackle specific aspects of problems, be they social, economic or environmental. To this end, it may be stated that the goal of ICM is:

"to improve the quality of life of human communities who depend on coastal resources while maintaining the biological diversity and productivity of coastal ecosystems." (GESAMP 1996)

In order for ICM to achieve this goal it should provide a process that supports an equitable, transparent and dynamic governance process rather than producing parallel structures that mirror or seek to replace systems of government in coastal areas. The challenge for scientists from all disciplines is:

1. to move from an ethos of gaining knowledge about individual discipline characteristics of coastal systems to an understanding of the multiple dynamics of the coast, and

2. convey this understanding to other disciplines and, more importantly, decision makers.

Therefore, for ICM to succeed the sciences must develop a greater ability to understand and predict the origins, causes, effects and dynamics of these conditions in order to provide decision makers with solutions to mitigate against their short, medium and long term impact on the sustainable use of the coastal zone. In order to achieve this requires the sciences to do more than simply describe the systems they are investigating as is the case, for instance, with traditional ecological studies, but, rather, to develop an understanding of the dynamics of natural and human systems in order to comprehend the reasons for change.

The coasts of South and South-east Asia

This manual is primarily orientated for use in South and South-east Asia. In this region, the health of coastal terrestrial and marine ecosystems (including coral reefs, mangroves and other wetlands, and estuaries) is essential to the maintenance of marine biodiversity and the ability of marine environment to provide resources for human consumption and use. For example, fish often provide a source of income and are a major animal protein source particularly for the poorest communities. Half of the coastal habitats in the South and South-east Asian region are considered to be under a high threat and only around one third under low threat from environmental degradation, user conflicts and/or development activity.

The coastal regions of South and South-east Asia support more than a billion people who are dependent to some degree on coastal resources. Coastal resources make significant contributions (15 – 20% of

GNP, FAO 1998) to the economies of these countries. This importance is reflected in the correspondingly high population density in the coastal strip. While coastal areas contain sites where there are significant levels of industrial development and wealth creation, there still remain large numbers of poor who are heavily dependent on traditional modes of resource use for their livelihood security.

Vulnerable areas and systems - and the sources of their problems

- *Coral reefs* - eutrophication, sediments, overfishing, destructive fishing, reef mining, the aquarium and curio trade, diseases.

- *Wetlands* - reclamation and development, including landfills.

- *Seagrass beds* - siltation, coastal development, eutrophication, physical disturbance.

- *Coastal lagoons* - reclamation, pollution.

- *Mangroves* - excessive exploitation, clearing for reclamation, development and aquaculture.

- *Shorelines* - development, modification of habitats, erosion.

- *Watersheds* - deforestation, soil erosion, pollution, loss of habitats.

- *Estuaries* - reduced water flows, siltation, pollution.

- *Small islands* - changes in sea level, waste management, pollution.

- *Continental shelves* - pollution, fishing, dredging, navigation.

The predicted trends in coastal resource utilisation are unsustainable. The associated degradation of the environment that supports the livelihood of coastal peoples' and the enduring poverty in some coastal communities has now become a vicious cycle. Accelerated developmental activities and allied pressures are creating more conflicts among and within user groups.

Most South and South-east Asian countries have a very short post-independence history. During this post-colonial period the different countries have gained very different political structures and policies, however they still essentially have similar resource based economies. Hence, tackling environmental degradation, loss of habitat and resource base combined with increases in population and high levels of persisting poverty presents a test for the individual governments. The challenge of developing and implementing effective policies and plans to address these issues is complicated by the existence of governance structures that may require reform in order to operate in an integrated way.

ICM as a tool for the South and South-east Asian region

Most of South and South-east Asian countries have started ICM programmes that are at various stages of implementation. In 1981, Sri Lanka started coastal management through a conservation and environmental protection approach; the Philippines and Indonesia are experimenting with community-based coastal resource management strategies using Marine Protected Areas; India is using setback lines and developmental regulation as an instrument for Coastal Zone Management; and Bangladesh has just initiated the establishment of an ICM coordination office to bring together the coastal activities of line Ministries.

However, despite recognising its potential there is unfortunately a number of commonly recognised barriers to effective ICM in the region. Among many factors, the most important constraints experienced by countries in the region in implementing ICM as a development tool are:

- The relegation of ICM behind other policy priorities and an associated belated awareness of the significance of the integrity of the coastal zone to sustainable development,

- a shortfall in organisational capacity, and

- a lack of trained manpower to design and develop implementable holistic and integrated ICM plans.

Need for Capacity Building in South and South-east Asia

Although scientific expertise, research, data and information are readily available within the region, this is fragmented and a greater reliance has been placed on bringing expertise from outside the region to address programmes. Generally individual Government agencies approach coastal issues on a sectoral basis and solutions are formed in an *ad hoc* fashion and interventions are not long lasting. Integration of knowledge, skills and information etc. at different levels within the administration and between the different stakeholders is not happening. This problem of policy coordination is a standard and recognised one in developed and developing countries. In all cases where government is organised in sectoral ministries there is difficulty coordinating on 'area' issues. Hence, it could be argued that there is also a need for structural reform if there is to be capacity for ICM as a sustainable develop-

ment tool. Central, however, is the design, development and implementation of effective ICM programmes.

The lessons learnt from Sri Lanka, which has one of the longest histories of coastal management in the region, suggest that ICM needs to address:

- National frameworks must include a mechanism to involve coastal communities and local Government.

- Management activity is often too restricted to coastal erosion and regulatory development along the shorefront.

- Resource management focussed on regulation alone is too narrow in scope and cannot meet the complex needs of coastal communities.

- Facilitating co-operation between discipline/sector/institutional interests is essential but not easy.

- Ecosystem management has to focus on human activity derived from resource use and exploitation.

- There is an absence of relevant science and/or no mechanism to disseminate what is already known.

From: Brown, B.E. 1977. ISBN 1861920407, and Kay, R. & Alder, J. 1999. ISBN 041924350-X.

Introduction

Enormous talent is available within the region within scientific, academic administrative cadres coupled with longstanding traditional indigenous wisdom. However, in general this talented pool of people can benefit from training to advance their ability to apply existing knowledge, expertise and experiences to ICM. To achieve this training for capability and capacity building for ICM is not straightforward. Before there can be any training, it is essential that a training methodology is adopted that will inculcate a holistic and integrated approach to the management of coastal areas. Such a training methodology will, out of necessity, have to reflect the diversity of discipline and sectoral inputs required for successful ICM. Training in ICM, therefore, involve a team of trainers. The *Training of Trainers* programme is designed to develop a pool of trainers with a capacity for the design and development of short training courses in ICM that is underpinned by a coherent strategy for training in ICM.

Adopting an appropriate approach to training professionals that contrasts with the more traditional knowledge-based focus of much University teaching is required. This means moving on from courses that have tended to deliver three types of information to participants:

- Coastal science (including socio-economic science).
- Coastal Management.
- Case studies to illustrate the above.

The use of this approach leads only to enhanced knowledge within individual disciplines that can, in turn, lead to a greater awareness of the inter-disciplinary links between disciplines that may aid coastal management. This form of teaching presents the fundamentals of coastal science and law that participants are asked to use to solve problems. From the point of view of the participants this apparently clear aim is confusing since they fail to see the whole while being presented with the parts. This is not the same as inculcating an approach to ICM where the emphasis in curriculum modules is on keeping an integrated perspective in all sessions.

The format adopted in the design and implementation of training given here takes account of the inexorable pressure for economic development, particularly in developing countries, and the associated social and environmental concerns that result and which can be under emphasised in analysis. Mitigation of such concerns on the environment usually takes the form of conservation that seeks to limit the more negative impacts of economic development. The approach described in this manual focuses on problems posed by the environment and for human use of the area. The aim is to recognise the human pressures and to respond to these pressures by advising on measures by which risks may be reduced or eliminated through three major objectives:

- A sustainable and functioning environment,
- minimising risks to people and property, and
- minimising costs to sustain development.

In order to achieve the three objectives outlined above, a training programme must develop capacity and capability to:

1. Identify existing uses of coastal areas with a focus upon their inter-actions and interdependencies, and

2. identify issues from a perspective of the activities that link the environment to human uses of the available resources.

Such a programme must provide learning outcomes so that skills developed from a training course address three key constraints of implementing management decisions:

1. The lack of a knowledge base that integrates an understanding of the functioning environment and the impact of development interventions into one overall strategy.

2. An absence of management regimes that integrate analysis, decisions and responses to coastal problems.

3. A system of governance that fails to integrate the policy and management decisions through the political process. The establishment of an effective framework for the governance of the environment requires the dichotomy between socio-economic development and environmental conservation to be addressed in relation to the underlying political context.

Addressing these constraints often and, perhaps, most satisfactorily, can be achieved by non-specialists who manage and determine the inputs from specialists. Non-specialists therefore require a structured and unambiguous procedure that can be applied to a complex reality.

The lessons and approach on this manual are based on the ICZOMAT project and therefore reflect the goal of developing the training skills, short course design and curriculum necessary for improving the professional approach to complex coastal issues through means other than academic training. However, a barrier to achieving this was the absence of an overarching structure to the process of ICM that provided a common framework and reference for trainers and course participants.

A Framework for ICM Training

To facilitate training in such a complex and interdisciplinary area, a systematic and incremental approach to the ICM process is required. This approach is diagrammatically represented by a framework (Figure 2.1) that is designed to addresses four fundamental stages of the ICM process:

- Identification of knowledge and information and inputs required from each discipline and sector to support the ICM process.

- Integration of sectoral information on physical, biological and human dimensions of the coastal system.

- Identification of significant interaction between processes operating within, and between, the three dimensions.

- Analysis of these interactions to identify the key issues and a range of implementable management options.

To achieve this process, the framework provides a means to assimilate information that can be interrogated using simplified tools accessible to non-specialists. These tools can synthesise and analyse a diverse

Figure 2.1. A Training Framework for ICM.
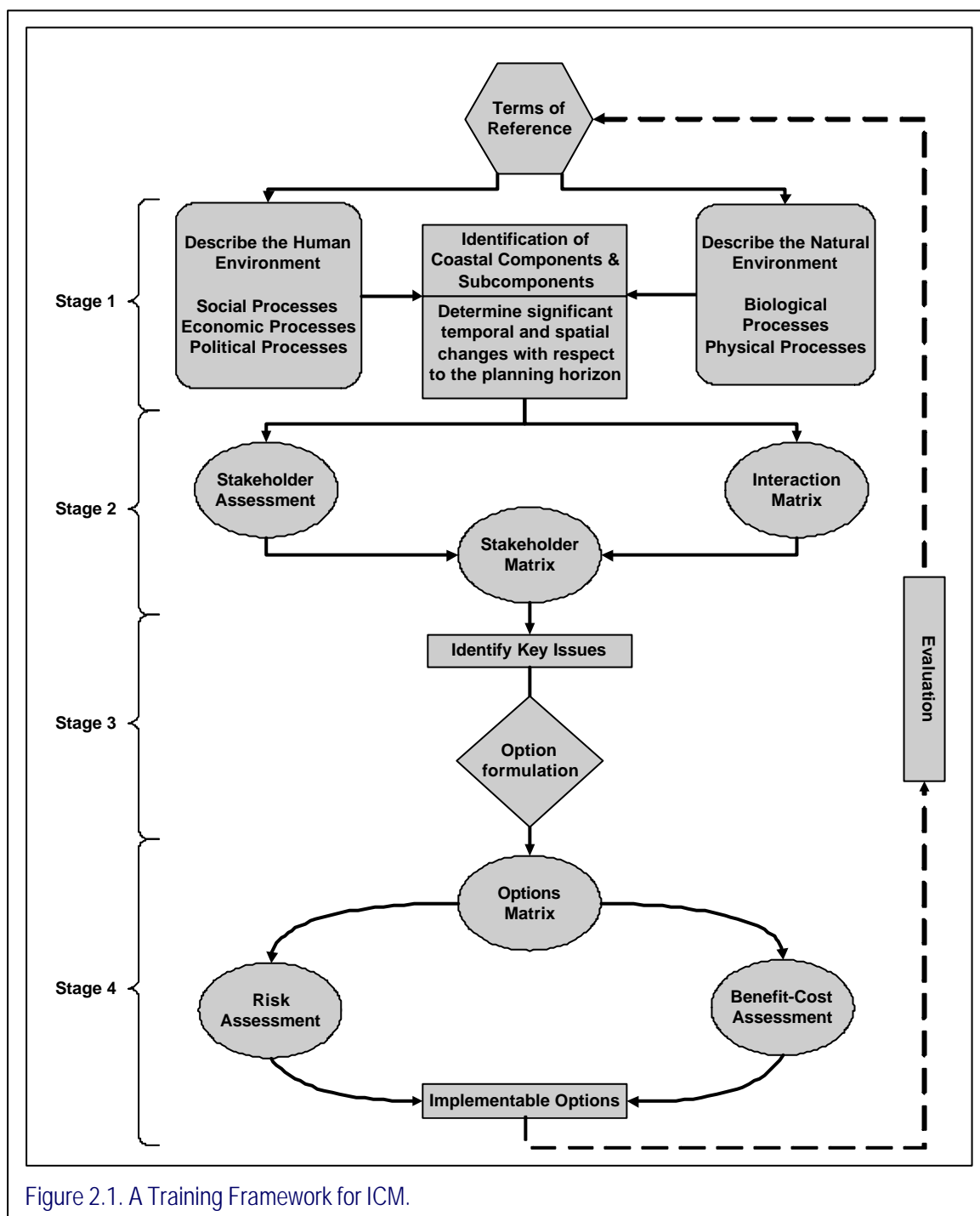
array of interactions in order to guide coastal managers towards the determination of implementable options. Each stage in the framework incrementally filters, refines and reviews the outputs from the previous stage. This leads the user from an essentially knowledge-led foundation derived from a wide range of sector and discipline sources, which is then analysed to identify the key issues/problems that are impacting the plan area, through to the formulation of potentially implementable integrated management options.

The ICM process described by the training framework incorporates an integrated approach to ICM because it includes:

1. The spatial characteristics (physical, chemical, biological, ecological) of land and marine forms of coastal regions,

2. temporal aspects of dynamic processes occurring within the plan area and the planning horizon of the intended ICM plan, and

3. the interrelationships among the various human uses of coastal areas and resources, as well as associated socio-economic interests and values.

The training framework is designed to be applied using a case study that allows the training process to take place within a virtual scenario of ICM, presenting to the delegates an experience that is as real as possible to the experiences they might expect to encounter in their workplace. The framework provides a structured and sequential guide to the process of ICM that may be used by both trainers and delegates to underpin the training course.

The framework is used throughout the short course in ICM as a means to:

- Help trainers ensure all training activities and individual contributions support the ICM approach,

- provide a common structure for delegates to validate their development and progression in terms of acquiring enhanced ICM capability, and

- provide a common reference between trainer and delegate.

The framework is 'entered' through a *Terms of Reference* (ToR) that set out the goals and objectives of the training exercise in the form of a statement that covers the background to the plan area and the management objectives as well as information on:

- The geographical boundaries,

- the timescale of the plan, and

- other specific issues affecting the plan.

The ToR provides a benchmark against which the relevance of information and activity can be evaluated. Progression through the framework then takes place as 4 discrete stages that sequentially develop:

1. A knowledge-base focussed on understanding the plan area and the changes that are taking place within it (Stage 1),

2. an evaluation of how changes are impacting the plan area and the stakeholders that utilize the available resources using a stakeholder and matrix-based tools (Stage 2),

3. identification of key issues for management focus to fulfil the ToR, and designing a range of options to ameliorate identified issues: both issues and options are arrived at through negotiation and consensus amongst the delegates drawing on their own experiences and expertise supplemented by 'outside' expertise as necessary (Stage 3), and

4. a means to evaluate the likely success of each option to reduce the risk to people and property whilst assessing it's likely cost and appraising the outcomes against the original plan objectives et-out in the ToR (Stage 4).

The framework is supported by four types of tool that facilitate the interrogation and analysis of information:

1. **Stakeholder assessment** provides an insight into the major socio-economic

drivers, and also allows an assessment to be made of the relationship between the relative influence and importance of stakeholder groups with the intended outcomes identified in the ToR.

2. **Matrices** that provide a structure for prioritising information and also to ensure discussions become clearly directed and non-sectorally entrenched. Three forms of the matrix are used;

- Interaction Matrix that provides a means to explore the interactions between the main components of the biological, physical and human environment and their expected changes.

- Stakeholder Matrix provides an overview of the impacts on people of future changes in the coastal area.

- Options Matrix that can be used to check for stakeholder benefit from proposed management options, filter out options which have strong negative impacts on stakeholders and also to enhance management options to maximise stakeholder benefits.

3. **Risk Assessment** that can be used to document evaluation of risk before and after an intervention takes place. By considering a range of alternative management options an evaluation of the relative risk can be made and management options compared.

4. **Evaluation of benefits and costs** that uses a simple framework to enable a basic, and subjective, assessment and comparison of the benefits and costs associated can be used to evaluate the various management options for a particular issue.

Conclusion

It is important to realise that the framework described here is not proposing an alternative project cycle for ICM. There are already many descriptions for an ICM project cycle under a number of different titles (see references accompanying Module 1, Session 1). Rather the framework is explicitly focussed on providing a structure and organization to a training process to develop capability within individuals to engage with the demands that multi-disciplinary, and cross-sectoral, environmental and natural resource management entail. The framework and supporting tools provide a forum and reference for individuals from a diversity of backgrounds, expertise and experiences to collectively discuss, negotiate and debate through stages of information assimilation, analysis, interpretation and deduction of management options. This can take place without the barriers of language, terminology and methodology that often surround the discourse within individual disciplines, and which prevent the active participation of those from other disciplines.

The framework is intended to be used in conjunction with a case study that exposes participants to the reality of management challenges, but within a safe environment where mistakes may be made and can be learnt from. This practice encourages a greater awareness and openness to the value that management options derived from an integrated and holistic approach may make towards addressing the challenges presented by dynamic coastal environments to policy makers.

Introduction

Coastal management is often constrained by a paucity of expertise in an integrated approach to coastal issues that is essential to inform policy and plan formulation. One of the more significant constraints associated with this issue is the absence of focal institutes that can take an interdisciplinary approach to coastal resources management, and which can transfer the awareness of an integrated approach to relevant organisations (Government, Business and NGO).

A training course designed to promote an interdisciplinary approach to coastal management, and develop capacity and capability in ICM, will require training inputs from a wide range of different disciplines that is unlikely to be provided by a single organisation. Therefore, the lead organisation will face challenges regarding:

- The coordination of multiple inputs,
- The maintenance of a common style of training methodology, and
- curriculum design that meets the needs of participants and trainers.

This chapter covers the project management requirements to make possible such a training process and facilitate the development of a coordinated training team and an integrated curriculum described in Chapters 4 and 5 respectively.

Management Structure

The personnel that will contribute to a training project for ICM are unlikely to be drawn from a single department or organisation. Therefore, the appointment of a Project Director with a high institutional profile is required to ensure a high level of

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Box 3.1.

Project Director ToR:

1. oversee overall management of the Project,

2. facilitate high level integration with uptake Institutes and NGO organisations, and

3. provide support for Project Manager specifically with regard to the identification, selection and procurement of suitable candidates for *Training for Trainers* workshops from both Universities and the User base.

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commitment from both host organisations, and surrounding supporting organisations, to give time and personnel to the project (Box 3.1). The Project Director should be supported by a full-time Project Manager (Box 3.2).

Box 3.2.

Project Manager ToR:

1. Assist in the development of the training curriculum,

2. Coordination of the identification of trainers, timing of their respective inputs to the training programme and supervision of their contracts,

3. Identify appropriate training materials,

4. Evaluate impact of ICM short-course,

5. Modify short courses as directed by Annual Training Board review,

6. Prepare annual project reports, and

7. Assist in the establishment of an ICM network, and identify and respond to other demands for ICM training from Regional, National and NGO sectors.

The Project Director and Manager should be supported by a core group of course trainers who together constitute a Training

Board that has responsibility for the design, review and appraisal of the Short Course structure, and agree on any modifications to the training plan.

Establishing a Training Team

Training in ICM requires inputs under the following broad headings: coastal land-use planning; coastal ecology; physical coastal processes; coastal resource management; social development and resource-use conflict management; economic and legal aspects relevant to coastal areas; and methodologies for delivering coastal resources inventories. To cover such a wide spectrum of subject areas will necessarily involve training provision from a large number of subject specialists: This produces two particularly challenging issues:

1. How to ensure commitment to, and a sense of ownership of, the training programme by all trainers, and

2. how to ensure the training provision is coordinated and has the appearance of a 'single' package, rather than a series of unconnected discipline specific inputs.

The design of the *Training of Trainers* programme (Chapter 4) and the design of the *Training Framework* (Chapter 2) largely overcome the technical difficulties associated with these issues. However, to ensure that both project managers and individual trainers are clear of their responsibilities to each other a form of contract should be offered. This is important because each individual's contribution will be a small piece of a larger jigsaw – if it is not the right 'shape' it will not fit.

Having established a clear working relationship with contributors, the project manager

is then able to establish a robust project infrastructure that includes:

1. Set up subcontracts (or a Terms of Reference that defines; scope, budget, schedule and deliverables).

2. Set out a work plan (dates for deliverables and clearly what is to be done, noting resource requirements and constraints etc).

3. Develop a schedule with milestones (identify when e.g. drafts have to be submitted for review, etc).

4. Set up budgets and a tracking system.

5. Establish the project quality assurance needs and the quality controls systems.

6. Identify barriers (economic, technical, cultural and/or regulatory) to the success of the project.

7. Establish mechanisms for information management and document filing.

Agree will all contributors

- A formal statement covering learning outcomes, and style for text, slides, exercise materials, must be agreed in writing. This is often most important with colleagues well known to the Project Manager.

- Amount and time of any remuneration and what it covers, e.g. inclusive or exclusive of preparation time.

- Arrangements for any inputs for fieldwork including logistics.

- Terms of reference for their contribution – who are they teaching, why, content, learning outcomes.

- The deliverables, e.g. handouts, any follow-up exercises, assessment/feedback.

Delegation of tasks by the Project Manager can be an effective tool to promote ownership and commitment to the project, motivate and build teams, facilitate and build consensus through networking and communication. A key role for the Project Manager is to ensure good communication between all the contributors so each knows where they stand and fit in to the whole picture. Each contributor becomes an advocate for the part of the project in which they are most involved; this promotes debate and interaction. Respect for technical judgements is essential as no one person can be an expert in all disciplines. However, it is important that individual contributions are considered objectively to ensure they fit coherently with the whole.

Management of a multi-disciplinary team is best achieved by keeping the focus on deliverables and goal-directed added value. This can be helped by:

- Using a common framework of explanation and presentation - i.e. report formats, meeting documentation, training materials,

- communicating with the team individually and as a whole, and

- rigorously performing, exacting quality control.

During the Short Course, project management and implementation is likely to evolve, initiated by one or more of the project stakeholders or as a result of internal review. The role of the project manager in this circumstance is to make certain that all contributors are party to, and involved in, the decision process that instigates change to ensure changes are positive and improve the overall project. It is especially important that a change in one component of the project does not adversely impact the whole.

Curriculum design and delegate training needs

The success of an ICM course is not only dependent on the content of the course programme. For a training programme where the participants are likely to come from a workplace that has involvement in coastal issues, a number of issues arise that require careful consideration:

- Participants will have a wide range of expertise and experience working in the coastal zone. It is important that the training team are aware of these individual backgrounds and that the training programme may need to be adapted to reflect these. It is also important that individual trainers are aware of who has, and has not, wide experience/expertise in subject areas they cover.

- The curriculum design must articulate the benefits of attending a course on ICM. Although this might appear obvious, where participants are already involved in coastal management issues, they can feel that their professional competency is being challenged if presented in a manner that suggests that current practices are inadequate and/or poorly executed. This is difficult where current management efforts focussed on the coastal zone are failing.

- Participants are likely to have largely single sector/discipline backgrounds, whereas ICM promotes a multi-sector and discipline approach: This can produce some resistance amongst partici-

pants who might feel that they are being asked to relinquish their existing professional control in the workplace to other interest groups.

A training need's analysis (TNA) is the most effective way to identify these issues. A TNA should be carried out as far in advance of the course as possible in order to plan and prepare for any necessary course changes. Such changes can arise from conflict/differences between individual participants in terms of their training needs and experiences/expertise they bring to the course.

Understanding the background of participants, their reasons for coming on the course, their aspirations and expectations will provide the project management team with the opportunity to help trainers prepare the detail of their session in a manner that will maximise the learning outcomes for the participants and their enjoyment of the course.

Participants should be prepared prior to their arrival for a short course programme through receipt of an Induction Pack well before the course start date that covers:

- The purpose of the course,
- key personnel and how they may be contacted,
- how they may be contacted whilst attending the course,
- accommodation and available facilities,
- information on the locality,
- social programme,
- teaching styles and methods,

- mechanisms for evaluation and feedback, and
- overview of the course including an outline timetable.

Managing the Short Course

The proposed structure for the Short Course advocates a three week programme with each day consisting of four 90 minute sessions to allow for mid-morning, lunch and mid-afternoon breaks (this schedule will likely be modified during fieldwork sessions). It is important that participants are not overloaded during each day as this is likely to reduce the deep learning that they acquire over the course.

The first day of the course is important to inculcate a team atmosphere between both participants and trainers as well as to open the minds of the participants to look outside of their own expertise and experiences with regard to ICM and coastal issues. Given the natural sciences background of the majority of Government Officers whose remit includes the coastal zone, there is a tendency in their minds and during the course to follow a structure in which the natural environment forms the pivot around which the human world revolves. This is a mistake as the focus of the course should be to develop capacity in ICM in order to promote sustainable development and protect the livelihoods of coastal communities.

It must be remembered that participants are likely to be highly qualified persons with an extensive work experience. Therefore their views and opinions must be given respect and time given in individual sessions for views to be aired and discussion encouraged between participants as well as with trainers.

Although care should be taken to ensure the planned schedule is achieved, a degree of flexibility should be allowed for contributions and discussion by the participants. However, discussion should be guided so that neither trainers nor the participants loose sight of the need for and applicability of the integration of the different disciplines for ensuring a holistic management approach of coastal systems.

Managing External Contributors

The indicative sessions that form the Knowledge Module are designed to cover the generic issues associated with coastal management. However, it may be necessary to arrange seminars to cover particular aspects of the selected case study area. For instance, if the case study area has been heavily engineered, e.g. sea walls or other man-built structures, then a lecture by a coastal engineer to discuss design considerations and choices would be appropriate. Such seminars are likely to be given by experts who will not be familiar with the Aims and Objectives of the Short Course, the

training methodology and approach or background of participants. It is very important that seminar contributors are fully briefed in order to orientate their presentations, teaching style and discussion to the context of the ICM training Framework. Seminar speakers will be experts in their field of knowledge: As the ICM Short Course is designed to make participants aware of the need for integrated approach of coastal management, the speakers need to be encouraged to tailor their inputs to ensure the content and terminology is coherent and accessible to participants from a wide variety of backgrounds. Subject areas that may warrant a dedicated seminar, and their indicative learning outcome, are:

- Coastal engineering: Be aware of engineering options for shoreline protection, and design criteria and constraints.

- Shoreline Management: Be aware of the concepts and problems of shoreline management, and possible solutions.

- Coastal Ground Water: Be aware of the problems associated with exploitation of groundwater resources and possible management interventions.

- Coastal Wetland Management: Be acquainted with various functions, issues and options of wetland management

- Fisheries management: Be aware of the diversity of possible sustainable practices in fisheries & aquaculture.

- Aquaculture: Have covered the background to farm management, prawn seed culturing and husbandry.

- Conservation areas in the coastal zone: Be aware of the distinctive nature and

sensitiveness of coastal conservation areas and management responses.

- International and National Legislation: Be conversant with international and national laws and declarations related to aspects of ICM.

- IT and web-based information in ICM: Be aware of the use of IT and Web-based information for dissemination and sharing of knowledge in ICM.

Speakers need to be briefed on

- Aim of the short course.

- Course Schedule/time-table.

- Title of the session.

- Expected learning comes for the participants.

- Style of handouts.

- Need for a participatory approach to training.

- Participant's background.

- ICM training framework.

- Role of the session in the course.

- Available teaching aids.

- Name of the case study area.

- Duration of the lecture.

Domestic arrangements

The comments above are related to management of training, however, if the domestic arrangements for the participants are not suitable, then it is likely that domestic issues will arise and impact upon training activities. Consequently, it is the role of the training team to organise the domestic arrangements as well as possible within the budget. In addition, domestic issues that arise during the course (e.g. food too "hot", or too early in the evening, etc.) must be acted upon swiftly and appropriate action taken. In addition, to living requirements, it is also beneficial to arrange cultural visits in some evenings and at the weekends to give participants a complete break from the course.

Monitoring

The role of evaluation of the course by participants as a mechanism to ensure the course is achieving its objectives, and meeting their training needs and aspirations, should be emphasised. The best way to obtain this is to ensure that evaluation forms are completed and collected at the end of each day. Completed forms should be reviewed each day by the training team so that any issues and/or problems can be dealt with promptly, and this should be communicated to the participants so they can see the value of completing the forms.

Attention should be given to providing a comprehensive introduction at the beginning of each day, a holistic summary at the end of the day and establishing links between discussions that have taken place. This is particularly important during fieldwork to ensure participants achieve the fieldwork goals and to initiate the process of categorising and organising collected data.

During breaks it is also important that the training team engage with participants to ensure that domestic as well as training arrangements are proceeding satisfactorily - participants may well voice points that they would not be prepared to commit to writing in formal evaluations.

Introduction

The goal of the Training of Trainers (ToT) course is to supply a cohesive team through which the Short Course in ICM can be taught. The team created through the ToT should have two key features: a uniform empathy and adherence to the training model of the ToT and a sense of ownership over the approach and content of the ICM Short Course. These features are necessarily to maintain the coherence of the training team during the process of training the ICM Short Course. Training of ICM is not easy due to three main features:

1. ICM requires a wide diversity of multidisciplinary knowledge and blend of skills.

2. These multidisciplinary skills must be understood in an integrated context, rather than being perceived as a suite of sectoral disciplines.

3. ICM is a process not just a multidisciplinary collection of factual content, thus engagement with the process of ICM is necessary.

The format and style of training required to address the above difficulties can be very different to that used by tertiary level educators in many developing countries. A training team is required as the ICM Short Course curriculum involves a considerable amount of group work, which requires facilitation from a number of trainers much of the time. In addition, the Short Course requires a high degree of logistical support to ensure that the course is run effectively and efficiently. This logistical support must be carried out in a manner that supports the learning of delegates of the ICM course and

is sympathetic to the process of ICM. In light of these difficulties, the ToT course is designed to be a pre-requisite for the core training team that trains the ICM Short Course.

Consequently, intensive and comprehensive professional training in ICM in a Short Course format can only be carried out by a team of individuals who together can sustain an enabling environment for learning, be it in a group discussion in a workshop, or managing the logistics and task focus of a early morning visit to a fish market. The ToT course is designed to develop the capacity and skills of a team of individuals to allow them to deliver the ICM training.

The proven format developed within the ICZOMAT project ICM Short Course has used a lead trainer supported between by eight and eighteen core trainers who have passed through the ToT. This training group is supported by a number of expert seminars presented by expert speakers who have a prescribed brief for the training. The ToT is designed for the group of core trainers, however, the lead trainer must have considerable experience and experience of ICM beyond what is presented in the ToT.

What does the Training of Trainers try to achieve?

The ToT tries to develop a number of aspects that are required by an effective training team:

- A strong sharing and enabling team atmosphere,

- a common goal of developing a learning-orientated environment,

- An awareness of course design and quality management issues, and

- an appreciation and experience of group facilitation training skills.

In addition, the ToT also provides background to ICM:

- An awareness of the multifaceted nature of ICM,

- a detailed consideration of the training Framework in ICM, and

- an experience of using some analytical tools within the ICM training Framework.

In light of the requirements for learning about training, and to provide an overview of ICM process and tools, the ToT curriculum involves both these aspects of training and ICM. They are covered separately in the early sessions of the course, but from midway through the ToT course, they are integrated together and culminate in the individuals in the ToT designing and training a group activity in ICM.

Who can train on the Training of Trainers programme?

The ToT course is probably subtler, and less associated with content, than the ICM Short Course; therefore only experienced individuals can deliver the ToT course. The learning outcomes from a successful ToT course should not just be an increase in the knowledge of the individuals on the ToT course, but a change in their approach, attitude and behaviour towards ICM training. In addition, the ToT should itself exemplify high quality training, displayed, for example;

- By skilled mediation and facilitation in group discussions which are developing in an unhelpful tangential direction,

- ensuring all handouts and session materials are provided in a high-quality and timely manner, and

- commencing and terminating sessions on time.

The designated lead trainer should be involved in training the ToT course, especially in the sessions involving ICM. This also provides the lead trainer with insights into the diversity of skills and strengths of individuals within the core training team that is being developed. Additional to the lead trainer, a number of ToT trainers are required. These ToT trainers need to be professional and highly experienced in training ToT style courses. Within the CZOMAT course, ToT trainers were drawn from professional consultants in environmental training, university trainers of educational development (e.g. Staff Development Units, Quality Enhancement Units), or individuals who have wide experience of training and a background in development of training skills. Within a multi-annual project, it was found that the individuals on the ToT, after experiencing training on the ICM Short Course could themselves provide supportive role within further ToT courses. This has the added advantage, that once the ToT programme is initiated, a degree of sustainability is apparent.

In summary, the ToT training team must have a blend of academic credibility, experience of the ICM process, be expert and experienced trainers and have a supportive background in ToT theory and execution.

Within ICZOMAT, the ToT training team consisted of about five individuals (including the lead ICM Short Course trainer) and this is considered the minimum to achieve this required blend.

The indicative sessions provided later in this chapter, provide the skeleton to running a ToT course. However, the ToT cannot be successfully run just by delivering these sessions unless they are carried out by the type of ToT team described above. Considerable expertise, subtlety and negotiation is required to produce a robust set of core trainers for the ICM Short Course. As the core training team, developed in the ToT, are vital to the success of the ICM Short Course, then investment of time and money at this stage is a priority.

Who can go on a Training of Trainers course?

Anyone can go on the ToT course, however, to formulate a successful core training team a number of criteria should be considered as to the appropriateness of individuals who attend the ToT.

Availability and commitment. It is vital to identify individuals who are available, not just for the ToT, but also for the planned ICM Short Course. If the training operates over a number of cycles, then future availability for training on future ToT and ICM courses should be assessed. This will certainly involve negotiation with senior management in other Departments within the hosting institute or university, and often with external institutes, as it almost certain that one hosting centre will not have the full array of knowledge base required for the core training team. In addition, it is important that individuals are personally committed to the program, as it is always easy for excuses to be made in light of "more pressing" commitments.

Openness to change. In most cases the ToT requires changes in educational delivery, attitude and behaviour to allow the ICM Short Course core team to be jointly successful. Some individuals are more open to change, whereas others are less open. In some cases, promoting change in esteemed academics who have proven success in the academic environment for many years can be extremely difficult. Many of the trainers who have become highly skilled in the ICZO-MAT project were drawn from the younger members of academic staff.

Workplace stability. Erosion of the ICM training team through loss of personnel through moving jobs etc, can severely impact upon the ability of the training team to successfully carryout the ICM Short Course. Although, some degree of erosion is inevitable, the work stability of individuals who take the ToT training should be considered. Some compensation in the ToT numbers should be made in light of expectations of loss of personnel.

Valuable discipline base. Individuals within a wide range of discipline bases should be included within the ToT trainees. If they are all geologists, for example, then difficulties in embracing other disciplines within the ICM Short course would be apparent. Although invited experts are included in the ICM Short Course for presentation of some of the knowledge components – their inputs are for short, single seminar sessions. A degree of discipline skill is required by the core training team in these areas, both to

provide and negotiate a brief to the expert speaker, but also to subsequently make links between the expert's input and the subsequent stages of the short course. Consequently, the individuals who take the ToT should jointly cover the discipline areas of social, economic, physical and biological sciences.

Variation in content within the ToT

As noted before, the subsequent sessions provide a guide to the type of training that has proven effective in a ToT programme to develop trainers in ICM. Using an experienced cadre of training to execute the ToT means that they will have other sessions or concepts that would prove effective within the ToT. These should be built in within the skeleton ToT provided, either through addition of new sessions or substitution of sessions provided. The sessions provided have proved successful within the ICZOMAT project. However, in other training situations changes might need to be made which are geographically and culturally appropriate.

Whatever the final content of the ToT, it needs to suitably build up a core training team which can realise the learning outcomes within the ICM Short Course. This means that throughout the ToT course the ToT delivery team will need to maintain an ongoing negotiation with the trainees about how comfortable and confident they feel about the training style and approach. By the end of the ToT, the core team who will deliver the ICM Short Course must be comfortable and confident in their ability as a group. Flexibility within the ToT must be

negotiated to achieve this; otherwise successful execution of the ICM Short Course can be threatened.

The rest of this Chapter outlines eight individual ToT sessions which together have constituted a successful trainers development programme for the ICZOMAT project. Each session outlines the background and relevance of the content along with a set of notes for the session facilitator to use to guide them to the structure and material that is required in order to achieve the intended session outcomes. A compilation of course notes for participants on the ToT course is provided as the end of this Chapter.

Session 1: The Purpose of Training of Trainers

Background

Session purpose: Setting the scene of the Training of Trainers Course and using a group exercise for delegates to get to know each other and think about working together effectively.

The first session of the Training of Trainers (ToT) is important to set the scene about the courses, to identify expectations about the course and to start to develop group working among delegates who may not be familiar with each other or of working together. Many of the ToT participants might be expecting, even after reading the induction pack, a course about the fine details of ICM, rather than a course that emphasises tools and techniques of training within the ICM approach. Therefore a degree of clarity needs to be used in explaining what the course will achieve.

Many of the delegates on the ToT courses can be from universities and research institutes and have a long experience of education. It might not be clear to the delegates that the form and style of the training required in a short course is radically different to that which is predominately used in tertiary education in many developing countries.

It remains a challenge that delegates cannot be told this and be expected to change their approach to education, but have to learn it in order to incorporate changes through the experiences and reflection on the ToT. Table 4.1 identifies a few of the major differences between traditional academic education and the short course methods. By the end of the introductory session it is vital that the expectations of the delegates are in line with the stated outcomes of the ToT course, and that they realise the large divide between tertiary education and professional training.

Contrast of 'professional' knowledge to 'University' knowledge:

- *Professional knowledge* is procedural, specific and pragmatic. It deals with executing, applying and making priorities.
- *University knowledge* is declarative, abstract and conceptual. It deals with labeling, differentiating elaborating and justifying.

Biggs, J. 1999. ISBN 0335201717.

The indicative course notes for this Session give an introduction to the TOT and then they describe an interactive information-

Table 4.1. Contrast of University-style teaching with the training requirements for ICM.

Traditional academic education	ICM training
Lecture based	Diversity of approaches to capacity building
One-way (educator to student)	Multi-way dialogue (delegates – groups – facilitator)
Teaching centred	Learning centred
Learning and individual task	Learning a group task
Information rich	Concept and process rich
Reductionist and specific	Holistic and with context

sharing exercise. The first part of this session identifies the outcomes from the methodology used on the course. It uses the term "learning outcome", which initially might not seem the easiest of terms to define. But, as the delegates will become aware at a later stage in the course the learning outcomes are a key component of contemporary curriculum design.

The second part of the session details an interactive group activity. This allows the delegates to get to know each other but, more importantly, starts them off on a process whereby they become more aware of group dynamics and the process of self-evaluation. The following course notes provide guidance for the trainers who will be running the session.

Trainer's notes "Sharing information in a coastal community"

These notes provide the trainers with guidance on how to run the session, indicative handouts are supplied in the Appendices.

Group size

- Groups of 6 delegates

Time required

- Approximately 2 hours

Materials

- A copy of the Coastal Community instruction sheet to each participant
- A set of the Coastal Community "Bits of Information" cards for each group. Each set contains six different cards with five pieces of information.
- A Coastal Community feedback sheet for each participant.

Setting

- A room in which all groups can work without disturbing each other, or, preferably, a small room for each group.

Process

- The facilitator leads a brief discussion of co-operation and collaboration, then introduces to the participants an opportunity to explore some aspects of collaboration through experiencing being part of a coastal community.
- The facilitator divides the participants into groups of six members. It is possible to have groups of seven, with one person acting as an observer. It can be possible for the facilitator or a helper to join a group to make it up to six, however, they must play a passive role in the group process.
- Each participant is given a copy of the Coastal Community Instruction Sheet, and time is allowed for delegates to read it though and ask any questions.

- Then the facilitator hands out the six "Bits of Information" cards, giving one to each member without other members seeing the card.

- The task is, through information sharing, for each member of the group to be able to say their: name, the type of animal they keep, fruit which they grow, location within the village, type of house and type of vehicle they drive. The facilitator gives groups 20 minutes to complete the task.

- It is worth the facilitator, or assistants, keeping careful watch over the groups, and record their own views on a copy of the Feedback Sheet.

- After about 15 minutes, if the groups are not getting close to the solution, then it is worth giving a clue to help find the solution:

> *"It may be worthwhile to arrange yourselves physically according to the locations of the houses in the village"*

- If groups think that they have the answer then they can call the facilitator over, if they get it wrong, do not identify to them what they have got wrong.

- When the groups have finished their tasks, or when more than 30 minutes has elapsed, the facilitator calls time and assembles all members keeping the task forces together.

- The facilitator instructs the members to each quietly fill in the Coastal Community Feedback Form and then leads a discussion on their reactions to the experience covering their comments from the Feedback Form and also facilitators/assistants comments. The discussion should cover how the various groups approached and organised the task division of labour, the emergence of leadership, the exchange of information, and compare and contrast various task-force group processes.

- As a further follow up each participant is asked to develop an individual action plan to apply the principles learned from the experience to other problem-solving situations. This can be discussed in groups or in the whole group if it is fairly small.

- The correct answers are shown below:

	Ramos	Jayasuriya	Thomas	Ashok	Rahaman
Animals	parrot	cats	fish	sheep	goats
Fruit	banana	guava	coconut	mangos	cashew
House	bungalow	red brick	log cabin	tourist cottage	farm house
Location	west	northwest	north	northeast	east
Vehicle	trawler	sports car	motorcycle	4WD	tractor

Reflection

This exercise is usually fun and effective at getting delegates to get to know each other. However, it also plays another role by trying to get people to work together and share information. In a small way this exercise attempts to mimic coastal management, which is a group process and in which there are lots of pieces of information that need to be put together to make a understandable whole. It is important to provide time for delegates to reflect on the exercise and to fill in some comments on the handout sheet. This is because delegates may not be used to reflecting and sharing thoughts on such personal things, and so to promote this for the first session creates an atmosphere for the rest of the ToT course.

Coastal Community – "Bits of Information Cards"

Information Card A	Information Card B
• The fish farmer owner lives next door to the house with a guava orchard • Rahaman raises goats • The person who lives in the bungalow raises parrots • Only one of the village houses is located on the east side • The person who lives next to Thomas drives a 4WD	• Thomas's neighbour raises sheep • The fish farmer also grows coconut • Ramos lives next to the red brick house • One of your group's tasks is to decide who drives a trawler • The houses of the village are standing in a semi-circle, beside each other
Information Card C	**Information Card D**
• Ashok grows mangos • There is a tractor in the garage of the farm house • Each person raises a different kind of animal • Jayasuriya lives next to Ramos • A motorcycle stands in the back yard of the log cabin	• The person who keeps cats lives next door, to the east, of the house with the banana trees • Every week boxes of fish food are placed at the gate of the log cabin • Rahaman raises goats • Only one of the village houses is located on the west side • Each of the five person living in the village drives a different kind of vehicle
Information Card E	**Information Card F**
• The log cabin is in the most northern position in the village • Each person grows a different kind of fruit • The farm house stands next to the tourist cottage • Jayasuriya drives a sports car • Ramos breeds parrots	• Only Ramos lives at the west end of the village • There are goats in the yard of the farm house • One of your group's tasks is to decide who grows cashew • Thomas lives in the log cabin • Each person lives in a different type of house

Session 2: Integrated Coastal Management – The "ICM Jigsaw"

Background

> *Session purpose: To experience working in groups in order to negotiate a consensus view about the relative position of the many "pieces" of coastal management.*

This is the first session that the delegates on the Train-the-Trainer experience ICM in this course. It is likely that they will have a variety of experience in ICM and also different views about ICM. This exercise provides a background to allow delegates to start to explore the diversity of subjects which ICM encompasses; in addition it provides a fertile environment for differences in views to be discussed. The exercise forces delegates to think outside their sectoral expertise, as the categories are organised to be non-sectoral, but linked to the basic stages within ICM (as identified in the ICM Framework which delegates will meet later in the course). Furthermore, the process of identifying the connections between a number of jigsaw pieces helps support the high degree of interconnectivity involved with the information that feeds into ICM and the management options that are proposed.

It is of benefit if the delegates feel overwhelmed with all the pieces that they are presented with, as one of the key problems involved in the ICM process is separating the relevant information from the irrelevant or unimportant. The discussions at the end need to be handled carefully so that the complexities of dealing with this information-overload and the necessity of prioritisation are apparent to the delegates. It might be of value to finish this session with the delegates understanding the complexity of information involved in ICZM and appreciating the necessity for guidance in journeying though processes. This will set the scene for the next session that introduces the Framework for ICM.

Trainers notes for "The ICM Jigsaw"

Group size

- This exercise should be carried out by delegates in groups of 4 or 5.

Time required

- Approximately 5 hours

Materials

- A copy of the "ICM Jigsaw" session notes including the jigsaw components

- Post-it notes – it is best to use one colour for each group, or use different colour marker pens for each group. Cards and sellotape can be used if Post-it notes are not available.

Setting

- One large room in which the groups can form separate areas.

- Three tables, three white boards or three poster size pieces of paper each clearly labelled with one of the three category headings.

Process

- The complexity of the holistic approach of ICM should be introduced by the facilitator.

- Then each group should select a term from the provided list and write it on a Post-it note and then decide into which category the item should be placed. Once the group has decided, then the Post-it note is stuck to the white board or table. This process is repeated for approximately 100 of the ICM jigsaw pieces. If the group feels that the item fits into more than one category then Post-it notes should be placed into more than one category.

- If a group has a vehement disagreement in the where to place the item, then the facilitator should mediate.

- Through this process the facilitator should keep a close eye on the patterns emerging in the categories. A number of possibilities might emerge:
    o Some items might be classified differently by different groups.
    o Some items will be placed in all three categories.

- Following the placing of a suitable number of "pieces" into the categories the facilitator should bring the groups together and commence a discussion. The areas for the discussion to cover should be:
    o The wide coverage of the ICM process.
    o The different classification of the some jigsaw pieces between groups – why did this happen, what were the reasons each group used to place the item?
    o The positioning of some pieces in all the boxes – what does this mean about the piece? Is there any similarity between the pieces, for example do they tend to be components of the environment, tools, management etc?

- As a follow on exercise take a random sub-set of the Post-it notes and to get the groups to discuss how they are integrated within the ICM process. The answers from the different groups can then be compared and contrasted in a final groups session.

Reflection

This session builds on the first session in that it is a group activity that involves a large amount of information. However, it does differ in that the information is based around terms used within coastal management. It allows delegates views on different terms to be aired and discussed, but forces a consensus to be built up around which category to place the term into. Again, this activity reflects the process of coastal management and involves group discussion and formulation of a consensus agreement.

Session 3: Introducing the ICM Training Framework

Introduction

Session purpose: To introduce the delegates to the ICM training Framework and associated tools.

This section of the ToT course is directed solely at increasing the knowledge of the future trainers of the ICM Framework and associated tools. It is vital that all trainers on the Short Course have background awareness of the Framework and the associated tools. This is because the structure and process outlined in the Framework is either implicit, or explicit, at all stages of the training in the Short Course. During the Short Course, delegates have to cope with large amounts of information of partially relevant material and focus upon the ICM task output. The Framework and the tools provide a way to facilitate this process outlined in the Short Course. This process will only be successfully achieved by assuring that activities and discussions are closely linked to aspects of the Framework. Consequently, trainers on the Short Course are required to ensure that Short Course delegates are kept on task; this requires a working knowledge of the Framework and associated tools.

This session is primarily knowledge-based, rather than trying to develop the training skills of the ToT participants. Consequently, it can be taught in a more didactic fashion. An introduction to the Framework can be found in Chapter 2. Clearly, teaching of the Framework and the tools cannot be successful without providing examples and allowing the delegates to experience the tools themselves. Because the framework and supporting tools underpin the short course, it is important that this session provides a detailed background and rationale for the design, structure and protocol of employing the framework as the delegates will have to pass the same on to the participants of the short course. Therefore the content of this session will be the same as that which delegates will themselves give during the short course programme. The trainers' notes below provide the background commentary, coupled to the guidance and practical usage of the Framework and the tools, in order to achieve this. The session notes to be provided for the delegates of the ToT are given in the Appendix to this chapter. These session notes can also be modified and given to participants of the short course.

The session notes provide worked examples of the tools and the delegates should consider these. Ideally, delegates should work through the examples themselves, to ensure that they have understood the concepts. Further, theoretical examples can be created if required. The Framework is more difficult for delegates to experience, as it overarches the whole of the Short Course. One method to show its use and relevance is to identify the linkage between the Framework and the sessions and activities involved in the Short Course timetable. Another method (see below) is for delegates to assess other ICM models and their potential use in the training environment.

By the end of this session the delegates should have a working knowledge of the Framework and the tools. Throughout the later sessions the structuring role of the Framework in the ICM Short Course should be constantly reinforced. This is par-

ticularly important in the session that involves the design of an ICM training session, as delegates should use the Framework to help then structure their session and their session's position within the wider ICM process.

Exercise

To be given prior to introduction of the framework: review of ICM frameworks.

Provide groups of delegates with a number of ICM frameworks, available in many books and reports. Get the delegates to look for similarities and differences between these models. Ask delegates to try to design a hybrid model that would be effective in a training environment. The whole group can then compare the frameworks designed by the different groups, and look for similarities.

After the Framework has been introduced, the groups of delegates can compare their framework with the presented Framework and differences can be discussed.

By the end of this session, the delegates should have a greater degree of ownership and awareness of the Framework, than if the Framework was solely presented to them.

Trainers notes for "Introducing the ICM Training Framework"

Purpose

The purpose of this section is to provide the trainer with guidance on (i) how to use the overall structure of the framework, (ii) the rationale for the supporting tools, and (iii) how to organise the training of the framework within the short course programme in ICM.

Background - Training with the Framework

The framework is designed to underpin and support the 'virtual scenario' case study approach to capacity building for ICM where participants develop capability to engage in the process of ICM through taking part in a case study that mimics the 'real' process of developing an ICM plan that they would undergo in their workplace. The framework is not an organogram for the short course curriculum as individual sessions of the short course may provide inputs for more than one phase of the framework and not necessarily in the sequence denoted by the framework. However, the framework does provide a sequence that ensures that analysis of the plan area does not occur before all the information necessary to understand the anthropogenic and natural dynamics is gathered; key issues and management options are not made before a complete analysis of the dynamics of the plan area has been made; and an emphasis on a single management option is not made before all the possible management options have been identified.

Within each Stage of the Training Framework a number of steps are identified: each step represents a discrete and distinct event within the ICM process that must be completed before progression to the next stage is possible. In the training environment that the framework supports, these events can take the form of one of four types of activity, denoted by the shape of the surrounding boundary:

1. Round-cornered boxes in Stage 1 denote the acquisition and collation of information.

2. Square-cornered boxes denote where the outputs from a prior event are evaluated and organised.

3. Elliptical boxes denote a training tool that is used to analyse outputs from a prior event.

4. Diamond box in Stage 3 denotes a participatory event involving team work, negotiation and consensus building.

Description of the ICM Training Framework

Terms of reference

Prior to commencing the ICM training process, and to mirror the reality of the ICM planning process, clear Terms of Reference (ToR) must be provided. The ToR should cover:

1. *The geographical boundaries of coastline that the ICM plan will cover.* The delimitation is most likely to extend across an administrative area, e.g. a planning authority or a State Government, and will not normally consider the functional integrity of the area. Therefore an initial task is to define boundaries in order to explore the array of management issues that exist within the plan area. Boundaries may extend outside the plan area where functional components of the environment and significant drivers for processes are outside the target area (e.g., sediment cells or important trading linkages). An issue, often assuming great importance, is the extension of the study area into the hinterland. In terms of the plan area, this will often be set by legislation (e.g., 500m in India, 10Km in China from high tide line). This task is complex and should be iterative with constant review taking place. For training purposes it is most appropriate to consider a variable inland boundary determined by issues that impact the plan area and the livelihood of coastal communities.

2. *The time scale over which the plan is designed.* The planning horizon should also be identified and might be given as a number of decades, for instance the Coastal Zone Notification in India sets this to 50 years. A long planning horizon can lead to contradictory management options compared with short term planning options, and predicting the distant future, in terms of physical, social and economic drivers, is very difficult. Preferable is to work with iterative shorter term planning horizons where predictions will have a higher degree of accuracy, but assess the options that emerge from each iteration against a longer term planning vision in order to include revised predictions for change and new information. An ICM plan should not be a static document once produced, but an ongoing process.

3. *Specific issues and goals identified by the plan originators.* Other aspects may be included in the ToR, for example, development of eco-tourism, improvement of the livelihoods of the rural poor, industrial development around a port. A challenge for an ICM plan is to incorporate such requirements whilst maintaining national and international commitments to sustainable development for all environments (terrestrial and marine), from the headwaters of catchments (watersheds) to the outer limits of exclusive economic zones (EEZ), whether or not they are subject to multiple jurisdiction (International conventions cf. National policy).

An example of a set of ToR that might be used for a short course is given below:

Example outline Terms of Reference (ToR)

Yayati is a coastal town of Bhusundi. King Gupinath wants an effective ICM plan and assigns responsibility the executive officer of the Yayati Development Authority (YDA). Major features of the local economy are: Tourism; Fishing; Aquaculture; Boat making; Ship breaking; and Cottage industries. Fishing, aquaculture and cottage industry products are primarily exported contributing the majority of foreign earnings. Tourists from middle to high income groups come for weekend breaks from nearby cities and neighbouring countries contributing 47 % of GNP, which is the greatest revenue earner. A major attraction is a dense mangrove forest with small numbers of tigers, moderate numbers of deer and many bird species.

Coastal characteristics of Yayati	
Length of coastline	25 Km
Population	30,000
Fishing and Aquaculture Workers	10,000
Length of sea wall protecting coastline	2 Km
Area of Mangrove forest	300 km^2
Number of aquaculture firms	10
Number of Boat making units	5
Number of ship breaking units	2

TOR for the management of Yayati provided by YDA

Yayati is a coastal town with 25 km of coastline. The mangrove forest at its northern side is degrading and needs conservation measures to protect tiger and deer populations: Poaching of deer is a major problem of this area. The YDA has made it compulsory for all hotel owners to supply potable water. The task of supplying drinking water has been assigned to the Public Health Engineering Department under the Minister of Public Works. The 'Safe Drinking Water Supply Project' started under the last plan period of the YDA; this project will need to be enhanced to provide additional supply envisaged from the introduction of eco-tourism, which has been criticized by environmentalists because the present mangrove ecosystem might be adversely affected. The mangrove forest also protects Yayati from storms that could jeopardise the tourism industry. The Coastal Regulation Notification restricts new development in a zone 500 m landward from the high tide line and any development options within 300 m of the forest boundary. The South coast is under threat from erosion and increased impacts of storm surges that threaten the tourism industry, agriculture areas, and public and private properties. Prawn seed collection procedures also collect 300 different fish species, which are discarded as a by-product. Some of the aquaculture farms are experiencing technology problem as well as diseases so that only 5 out of 10 farms presently functioning.

From an initial scoping study, King Gupinath has highlighted the following issues:

- A requirement for a management plan for the 100 km^2 planning area of YDA.

- Coastal protection for an additional 2 Km on the southern side of Yayati where new a tourism expansion program has to be undertaken.

- Conservation planning of 5 years for the immediate protection of tigers and deer and of 30 years for to develop sustainability of the mangrove ecosystem.

- Appropriate management action for aquaculture farms and prawn seed collection procedure to be followed for the next 5 years.

- Suggested action for increased income generation for primary stakeholders.

- To increase by 10 % the national income derived from tourism within 5 years.

Stage 1: Components and Change in the plan area.

The ToR, and especially the plan objectives, are used by the training group to determine the information will be required in order to develop a knowledge-base for the plan area that they can use to build up an understanding of the dynamics of the social, economic, political, physical and biological processes that are taking place in the plan area recognising that the boundaries of some of these dynamics may extend outside of the geographical boundaries set in the ToR for the ICM plan. Information is gathered from field work by the participants both by direct observation of the plan area and organised meetings with stakeholders. In addition, secondary sources should be used: these can include maps, census data, reports and published articles, newspapers etc. Information on the social, economic and political processes are assimilated under the heading of 'Description of the human environment' and that relating to the physical and biological processes under the heading of 'Description of the natural environment'. This distinction is in recognition that the data that will be used to populate the two knowledge areas is often markedly different both in its format and mode of acquisition. Examples of the categories of information that might be included during this stage of the framework are given in Table 4.2. The information acquired during this stage is then assessed and evaluated in order to:

1. Describe the natural or human-made physical components of the target area which are important features of the coastline under the headings of 'Coastal Environment', 'Land use', 'Ports and Harbours', 'Industry', and 'Housing and Infrastructure', and

2. describe the significant changes that are occurring, or expected to occur within the ICM planning horizon, which impact significantly on people or coastal resources. The changes are grouped according to the component from where they originate, i.e., climate change is grouped against changes in the 'Coastal Environment', whereas changes in industrial activity would be grouped against changes in 'Industry'.

The outcomes of Stage 1 are:

- A knowledge base of the natural and human dynamics taking place in the plan area,

- an understanding of changes taking place in the plan area and the causes of change, and

- the foundations for understanding the interdependencies between the natural system and the users and uses that are made of the resources and space available within the plan area.

Table 4.2. A list of coastal features, sub-features that might be included in Stage 1 of the framework and possible sources of the Information - √ Documents are maps, research papers, research articles, official documents, census data etc. and meeting stakeholders and field observations.

Environment	Features	Components	Sources of Information	
			Documents (secondary data)	Observation /Meetings (Primary data)
Natural (Physical & Biological)	Nature of the coast	Open coast, estuarine coast, , bank stability etc.	√	√
	Climate	Temperature, rainfall, wind, storm surge	√	
	Geology & Geomorphology	Geomorphologic features, soil stratification & classification	√	
	Ocean information & Coastal Dynamics	Energy , wave approach, tidal range , relative sea level change	√	
	Water Resources	Regional hydrology water table, recharge, salinity, water pollution, Sediment load, etc.	√	√
	Ecosystems	mangrove, coral reef, etc.	√	√
	Biodiversity	Species diversity, abundance	√	√
Human	Population	Density, gender etc.	√	
	Health	Disease, Nutrition, Sanitation, Drinking water	√	
	Education & Employment	Curriculum, literacy, unemployment	√	
	Economics	Micro economics, macro economics	√	√
	Land-use	Forest, Agriculture, salt-pans, Road network, Railway, Sea wall	√	√
	Industries	Agriculture, Aquaculture, Factories	√	√
	Infrastructure Facility	Port & Harbour, , Telecommunication	√	
	Government	Plans & Policies	√	√

Stage 2: Determining the Impact of Change.

It is likely that a change in any given component of the system will have an impact on other components of the system. For instance, a change in the sediment regime in an estuary is likely to impact the viability and working of a port upstream. The multiplicity of components and their associated changes within even a small plan area are likely to be many leading to a complex situation where identification, and prioritisation, of those changes upon which management should be directed may be obscure. This stage introduces three tools that aid delegates in this decision making process: Stakeholder Assessment, Interaction Matrix and Stakeholder matrix. Descriptions of these tools are given in the *Description of Supporting Tools* section below.

The first activity is to use the components and changes identified in Stage 1 (Table 4.3) to construct the outline for the Interaction Matrix and then explore the interactions of each change with each sub-component. The interaction of biological, physical and human aspects on the coast is complex to analyse, especially in a training environment. Consequently, the wide array of data and information which the delegate has experienced so far must be constrained and structured in a coherent fashion. This process will require a filtration and collation and logical structuring of information to enable the delegates to move towards a non-sectoral and generalistic perception of the target area. Constant facilitation is required at this stage, as delegates might find it difficult to move away from sectoral detail, especially in their own specialist areas.

Table 4.3. Examples of common Sub-components and Changes used to populate the Interaction Matrix.

Components	Sub-Components	Changes
Coastal Environment	Beaches and dunes, Estuary and creeks, Mangroves, Ground water etc.	Erosion, cyclone, sea-level, species depletion/introduction
Land use	Agriculture, Forestry, Seawall and breakwater etc.	Conversion to aquaculture, reclamation, seawall construction, etc.
Port & Harbour	Jetty, Storage etc.	Dredging, jetty construction, expansion & mechanization
Industry	Fishing, Tourism, Aquaculture, Ice plants etc.	Increase in pollution, Modernization, Market expansion increase in fishing efforts
Housing & Infrastructure	Hotels, Residential building, Government offices, Civic services etc.	Tourist inflow, increase of population, Greater urbanisation etc.

Evaluation of the resulting Interaction Matrix allows an assessment to be made whether the origins for change within the plan area are predominantly from natural changes, over which management action has little or no capacity to control, or human-induced changes, over

which the resultant effects management action can ameliorate. The stakeholder assessment methodology is designed to give an idea of the problems faced by the stakeholders, conflicts between the various groups and their participatory role in the planning process in the area under consideration. The various groups and issues identified in the stakeholder assessment have to be prioritised with reference to the plan ToR.

In order to target subsequent course activity the outputs from a stakeholder analysis are assessed against the plan ToR in order to determine the stakeholder groups that are to be the focus of management activity, and these are incorporated into the Interaction Matrix to produce the Stakeholder Matrix. These three activities are undertaken by each participant group through discussion and negotiation drawing on their own expertise and experiences facilitated by the course trainers. The outcomes from Stage 2 are:

- Recognition by participant groups that ICM is a negotiated process that is focussed on stakeholders in the plan rather than single discipline/sector interests,

- understanding that there is a differential impact on different stakeholder groups by each Change,

- prioritisation of target activities of the plan area for management action, and

- greater understanding of the dynamics of the plan area and their impact on the users and uses of available resources and space in the coastal zone.

Stage 3: Identification of key Issues and Management Options.

This stage involves identification of Key Issues for management activity, which is derived from the Stakeholder Matrix. The process of deriving Key Issues requires consideration of the Stakeholder Matrix, which highlights those changes that impact stakeholder groups, along with the objectives stated in the ToR. Each participant group should discuss what they think are the Key Issues for management activity that emerge from their the information they have acquired on the plan area and the tools they have used to assimilate and evaluate their understanding of the dynamics of the human and natural processes that are taking place. It is important that a consensus is reached within each group so that each individual's expertise and experiences have been brought to bear on the debate and 'traded' with their colleagues. This is likely to lead to the identification of Key Issues that are defensible and valid to all sectors and disciplines. Part of this process may well involve returning to the original information, or re-validating or modifying the Stakeholder Assessment, Interaction and Stakeholder Matrix analyses.

Once the key issues have been identified, each participant group is required to design management options that will ameliorate the issues identified. A management option may consist of a single management intervention, or a suite of interventions. Arrival at management options should be through role play in the form of a panel where as many different sectors, disciplines and opinions are given voice. In this way a greater diversity of possible options is likely to be presented each of which can be debated and negotiated in order to arrive at a

suite of options which are broadly acceptable to as wide a group as possible. This mimics the 'real' situation where any management decision is a trade-off between the many interested, and often conflictory, parties to the ICM plan process. It is beneficial if a number of 'experts' familiar with the plan area can be on hand to provide advice to the panel on the Key Issues identified. The outcomes from Stage 3 are:

- A negotiated consensus as to the Key Issues for management activity, and

- a negotiated formulation of management options to ameliorate the consequences of the identified Key Issues.

Stage 4: Evaluation of Management Options.

Before a management option can be put forward as a firm proposal for management action it must be assessed for its effectiveness both in terms of ameliorating the targeted issue and the benefits and costs to the plan area. This stage reinforces the principle that ICM attempts to reduce the risks of hazards on people and resources at least cost. Three tools are available to achieve this. The first, the Options Matrix assesses the impact of the proposed interventions on both the physical components of the coastal system and stakeholders. This process determines both if the planned Option impacts the targeted interaction and, importantly, whether it generates new interactions. If new interactions are generated these can be assessed in terms of whether they impact stakeholder groups and whether they are positive or negative. If significant negative interactions on the coastal components or stakeholders are identified at this stage then the option must be reviewed. If the Option is found to positively target the identified interaction without creating any further negative impacts, the Option can be further tested to confirm that it reduces risk to people and property in the plan area, through the Risk Assessment tool, and at least cost, through a third tool to assess the associated benefits and costs. Options that pass these tests have a high likelihood of success, and constitute 'Implementable Options'. A final step is to consider the Implementable options against the original ToR of the plan to determine that they meet the objectives. It is important that the success of any option is not determined solely by its technical merit but against a range of criteria that address the needs of all stakeholder groups in the plan area and the ToR of the plan. The outcomes of Stage 4 are:

- Possible management options are tested by the participants group to ensure they address Key Issues, and

- opportunity to modify and adapt options to better target Key Issues is presented.

Description of the supporting tools

Four categories of tool are used to facilitate the assimilation, analysis and interrogation of information within the ICM Training Framework:

(i) Stakeholder assessment

The purpose of the stakeholder assessment is to explore the outcomes of the stakeholder analysis against the identified beneficiaries identified from the Plan ToR. A stakeholder analysis is carried out to investigate the communities that play a role within the plan area.

Scrutiny of the social, economic and political processes to describe the Human Environment assesses activities of the people in the area under consideration, identifies and prioritises different groups of stakeholders, ensures all social groups are included in the planning process and identifies vulnerable groups. The outcome of the stakeholder assessment is the identification and ranking of the social groupings that best fit the results of the stakeholder analysis and the objectives of the ToR and which will be used during within the subsequent stages of the framework. The assessment process recognises that different people will have different views and interests in the coastal zone. This will mean that the planning process is essentially a contested process and, at the very least, is a process of negotiation amongst the planners as well as the stakeholders themselves. It is, therefore, important that these groupings are arrived at through discussion within the training group.

(ii) The Matrix

The Matrix is used as tool to support the delegates at critical stages in the Framework of ICM. Within the training course the Matrix is a tool which provides:

- A structure for the consolidation and integration of information collected at the earlier stages of the Framework, and

- a tool for orientating group discussion around key aspects of the ICM process.

The Matrix avoids "information overload" and helps to identify, and concentrate on, important information for the ICM process without focusing only on few limited sectors of interest to particular individual disciplines. In addition, group discussion with delegates on coastal problems, impacts upon stakeholders and potential solutions frequently became far reaching, sectoral and well beyond the scope of the plan, even with strong arbitration. The Matrix provides a structure for the prioritisation of information and also to ensure discussions become clearly directed and non-sectorally entrenched. One further benefit of the Matrix is that decisions are accountable as it provides the evidence to underpin and support decisions thereby moving solution decision away from the "expert mystic" to a consensus group outcome.

The Matrix sequentially develops as the delegates move through the Framework. The Matrix appears in the Framework in three different forms:

1. Interaction Matrix – this represents the interaction between the main components of the biological, physical and human environment and the expected changes in the physical and human environment.

2. Stakeholder Matrix – the structure of the Matrix is the same, however interactions that result in an impact upon stakeholder groups, identified from the Stakeholder Assessment, are highlighted.

3. Options Matrix – this Matrix is also similar in structure and involves the introduction of suggested management options, determined from the expert committee exercise, as further changes in the matrix. The impact of these management derived changes on stakeholder groups can then be assessed.

The Matrix is used as a tool to direct group discussion and solution formulation, and does not provide a "magic algorithm" for ICM. In addition, the Matrix is only as good as the users, consequently for effective execution, an enabling environment that promotes the input of the knowledge and experience of all the group members should be promoted.

The Interaction Matrix

The Matrix always has a common structure:

- Components are defined as natural or human-made physical entities of the target area which are important features of the coastline.

- Changes are defined as significant changes occurring, or expected to occur within the ICM planning horizon, which impact significantly on people or coastal resources.

Precise or scientific derivation of terms used in this definition such as "significant" and "important" is not useful and probably impossible, and should be negotiated and defined within the training group in a manner that promotes cross-disciplinary understanding, utilises the group expertise and common values.

Both Components and Changes have a consistent sub-structure: Coastal Environment, Land use, Ports and Harbours, Industry, and Housing and Infrastructure. Housing and infrastructure involves small-scale construction and infrastructure for service provision. The basic structure of the Matrix is shown in Figure 4.1:

Using the information collected and reviewed in stage 1 of the Framework the delegates can be led to define a number of Sub-Components within the five set categories and a range of Changes within the same categories. For use as a decision support tool in a training environment, it has been found that approximately 20-30 Sub-Changes and 20-30 Sub-Components provides a useful and pragmatic form.

Once the Sub-Components and Changes have been identified, the group determines the interactions between the Changes and the Components as a thought experiment that considers the effect of each Change on each Sub-Component. It is advisable to do this in a number of groups and then once the Interaction procedure has been carried out, to compare the Matrices and discuss the differences to an extent that one form of the Matrix is accepted by all groups for further analysis at a later stage. Some delegates may feel that to be quasi-quantitative, Interactions could be denoted as a plus or a minus, or scaled by magnitude (e.g. a scale of 1-5). However, this does not improve the value of the model as a training tool; consequently, such notations have not been used.

The placement of interactions on the Matrix not only provides a concise summary of the information collected and collated during stage 1 of the Framework, but also provides a degree

of broad interpretation of the dynamics of the plan area. Close consideration of the emerging properties of the Matrix has been shown to provide delegates with an improved, and sometimes a more subtle awareness, of the dynamics of the coastal system that they have been tasked to manage.

The simplicity and degree of subjectivity involved in using the Matrix can create problems among delegates. Many delegates might be from academic institutions, generally with a natural science background, consequently such subjectivity and value loaded activities can be alien and a desire for quantitative and objective tools strong. Although such tools are available, they are discipline specific and cannot be fashioned to accommodate the wide realm that the ICM philosophy encompasses.

The Stakeholder Matrix

The Interaction Matrix will identify a plethora of incidences where changes are impacting one or more of the sub-components of the plan area: The Stakeholder Matrix is used to identify those interactions upon which management should focus their attention. The underlying rationale here is that the interactions which impact the stakeholder groups identified from the stakeholder assessment are those that should be primarily targeted.

		Components				
Changes		Coastal Environment	Land use	Ports and Harbours	Industry	Housing & Infrastructure
	Coastal Environment					
	Land use					
	Ports & Harbours					
	Industry					
	Housing & Infrastructure					

Figure 4.1. Format of the basic matrix.

For each stakeholder group, each interaction from the Interaction Matrix is considered and marked if it has a significant impact upon the Stakeholder group. Again the use of the term "significant" must be used in a practical sense and include a valued-laded and consensus-orientated perspective. On the Matrix, interactions which would be expected to have a significant impact upon the identified stakeholder group within the planning horizon of the plan are modified from a tick to a symbol representing the stakeholder group. This process is repeated for all the targeted stakeholder groups and through this process a number of Stakeholder Matrices are developed.

The Stakeholder Matrix can provide an overview of the impacts of future changes on particular stakeholder groups in the coastal area. At this stage no discrimination is made between change for the better, or change for the worse, of the stakeholder groups. However, the reasons for linking a stakeholder with an interaction should be recorded.

The area of the Matrix in which the stakeholder impacts occur provides insight into the cause of impact and this will have management connotations. In addition, interactions that impact more than one stakeholder group deserve special attention, either to maintain if the impact is positive, or to ameliorate if impacts are negative. In a workshop environment, it has been found useful to use overhead overlays for different stakeholders.

The Options Matrix

The third form of the Matrix used is the Options Matrix. The Options Matrix acts as a check, filter or enhancement mechanism for suggested management options. The inputs into the Options Matrix are the proposed management options derived from the Option Formulation box in the ICM Framework, each of which is added to the Interaction Matrix as another category of change and then assessed for interactions against each of the Sub-Components. The number of significant interactions provides information on the consequences (both positive and negative) of following the management option over the planning horizon.

The second stage of the Options Matrix involves assessing the effect of proposed options on the targeted stakeholder groups. For each row of significant Interactions caused by proposed management interventions in the Matrix, a further identical row is generated below the first. Each significant Interaction on this new row is assessed as to whether the interaction caused by the proposed intervention will significantly impact upon the selected stakeholder group.

Interpretation of the Options Matrix allows the impact of proposed management on stakeholders to be determined. Some of the impact will be positive; however, it is likely that impact upon some stakeholder groups for some management interventions will be negative. If there are many negative interactions associated with stakeholders, then the management intervention should be questioned. To try to minimise negative impact and maximise positive impact on stakeholders, the Options Matrix can be used in an iterative way. Modifications can be made in the proposed interventions to try to maximise positive aspects to stakeholders. Consequently, the Options Matrix can be used to check for stakeholder benefit from proposed management options, filter out options which have strong negative impacts on stakeholders and also to enhance management options to maximise stakeholder benefits.

3. Risk Evaluation

Risk is an important concept within the decision making process involved in coastal management. As the ICM framework presented in this manual suggests, risk is one criterion that decision makers should use to arrive at a decision about the relative merit of each management option available to them. The definitions of hazard and risk are fundamental:

- Hazard – an event or process with potential for harm to people, property and the environment.

- Risk – the probability of a hazardous event occurring.

If risk is to be measured then three components of risk need to be identified:

- The hazard occurrence probability – the likelihood of a hazard occurring,

		Impact		
		Low	Medium	High
Probability	Low	1	2	3
	Medium	2	3	4
	High	3	4	5

Figure 4.2. Risk Evaluation Matrix.

- the elements at risk –the people and infrastructure affected by the hazard, and

- the vulnerability of the elements – the degree of impact that the elements would experience at different strengths of hazard.

It is the combination of these three components that allow assessment of risk to be carried out. These components mean that risk can occur on a variable scale from a high frequency - low impact hazard, to a low frequency - high impact hazard; such differences will enable development of management strategies.

Risk assessment methodologies tend to be very complex. Within the short course there is not time for delegates to carryout a comprehensive risk assessment. However, it is important that some basic concepts about risk are covered as this can help delegates to interpret risk analysis in the future. The risk evaluation matrix (Figure 4.2) can be used to support the assessment of management options in the ICM framework. The matrix divides risk into the probability of the hazard and the impact of the hazard. The risk matrix can be used to document evaluation of risk before and after an intervention takes place. Each intervention is considered in terms of its likely affect on (i) the probability of a hazard occurring (i.e. reducing the probability moves the risk vertically in the matrix) and (ii) the impact of the hazard if it occurs (i.e. reducing the impact moves the risk horizontally on the matrix). The objective is to design a management intervention that 'moves' the risk as far towards the top left corner of the matrix as possible. By putting a range of alternative management options into the matrix, participants can consider the risk associated with the hazard under present conditions (i.e. doing nothing to resolve the key issue) and then evaluate whether their proposed intervention will reduce probability of the hazard occurring and/or reduce the impact of the hazard.

4. Assessing benefits and costs

To analyse costs and benefits of a range of interacting environmental, social and economic impacts cost-benefit analysis is widely used as a means of comparing the relative benefits and costs of management actions: if benefits exceed costs then the management action can be considered acceptable. In the Short Course there is not the time for the participants to take part in a full cost benefit analysis. However, it is important that participants consider a comparison of the costs and benefits associated with possible options during the course and provides a rough and ready understanding of the process of weighing benefits and costs for decision making.

Using some form of tool for assessing relative benefits and costs can also establish a common framework within which economic, social, political and ecological information can be evaluated and the various solution options for a particular issue compared. This is especially important in ICM, where the interplay of these factors is critical. Thus, it can assist in determining preferred solutions for implementation as part of the coastal management programme. A template (Table 4.4) is used to compare the benefits and costs under headings of economic, social and environmental. Table 4.5 gives definitions of each of the row headings. The template provides a forum for participants to review the benefits and costs of each management option without having to assign 'real' values but in terms of their relative advantage/disadvantage to stakeholder groups as either 'major' or 'minor'. The summation of major and minor occurrences under benefit and cost columns can then be used to provide a comparison with other management options. As part of this exercise, a 'do nothing' option should be included so that management options can be compared to the *status quo*.

Table 4.4. Template for the Benefit Cost Assessment Exercise.

	Benefits		Costs	
	Item	Size of Benefit	Item	Size of Cost
Economic				
Social				
Environmental				

The training framework for ICM and the supporting tools are likely to be unfamiliar concepts. Their relationship to the course content in Module 1, the observations that are made during the fieldwork in Module 2 and, in particular, their incorporation into the report they produce during Module 3 will need to be constantly reinforced and reiterated.

Table 4.5. Definitions for terms used in the tool for assessing benefits and costs.

Valuation	Definition	Examples
Economic	The net positive or negative change associated with factors that have defined market monetary values – these can be goods and/or services	Income of stakeholders New expenditures Damage to infrastructure Changes in supply and demand factors
Social	The net positive or negative change livelihood status of households	Underemployment or Unemployment Changes in health status Loss/gain of educational opportunities Loss/gain of community support networks
Environment	The net loss or gain of environmental goods and services which may impact on economic and social aspects now or over the length of the planning horizon.	Loss of mangrove areas Degradation of soil quality Changes in biodiversity

Session 4 - How we learn: Models and Styles of Learning

Background

Session purpose: To consider the diversity of learning and teaching styles in relation to professional training and the ICM short course.

The key process, which delegates in the ICM Short Course will experience, is learning. The role of trainers in the Short Course can be viewed quite simply as facilitation of the learning of the delegates on the ICM Short Course. This is why trainers often are called facilitators. To optimise the learning in the Short Course delegates require learning to be central to the design of, and activities involved in, the short course.

Tertiary level education can sometimes be focussed around teaching, with an implicit acceptance that students will learn. There can be a number of ways to teach a session to achieve similar learning outcomes. In some cases traditional didactic lectures are the standard, whether or not this is the best approach to achieve the required learning. This session has been presented to attempt to get delegates on the ToT course to focus on the process of learning, and to start to think about ways to enhance learning outside the traditional tertiary level approaches.

To be successful in developing the capacity of delegates on the ICM Short Course to take part in ICM initiatives necessitates the use of a diverse range of training techniques. This is for two prime reasons:

- It has been found that development of sectoral knowledge in the components of ICM does not necessarily lead to enhanced capacity to undertake ICM. Although the process of ICM requires a considerable knowledge-base, knowledge itself cannot drive forward the process of ICM. Consequently, an ICM Short Course must build up both knowledge and awareness and experience of the process of ICM. This requires an appreciation of the learning benefits of using a diversity of teaching approaches.

- The delegates on an ICM Short Course can come from come from diverse backgrounds with different work experiences (e.g. administrative, scientific research) and different educational backgrounds and cultures. Consideration within the Short Course needs to be made of this and learning in a variety of ways needs to be promoted.

In light of the importance of learning on the Short Course and the diverse nature of learning that is required to achieve competency at ICM, this session focuses on learning. It should give the delegates of the ToT, who will subsequently train the ICM Short Course, a background in models and styles of learning, and also ways in which learning can be promoted in a training context.

Trainers notes for "How we learn: Models and Styles of learning"

This session can be delivered in a reasonable didactic fashion, as there is quite a large amount of content to cover. However, care should be taken to include periods for discussion about how the content of these lectures related to the delivery of the ICM Short Course.

Session 5: Short Course Design

Background

Session purpose: To introduce delegates to a model that aids the design of courses and sessions.

To forge educationally sound and logical links between planned intentions, course content, teaching and learning methods, and the assessment of trainee learning, the short course has to be designed in such a way that the training need of the trainees within the ICM Framework is appropriately addressed. It is only through such a robust approach that the course can be efficient and effective and create a proper understanding of the ICM approach within the short span of time of the Short Course. This session considers a number of aspects of Short Course design that should be carefully considered by the training team prior to design and execution of a Short Course.

The session is based around a cyclical model for short course design. The model should be returned to at various stages during the lecture to provide a structural underpinning to the session.

Trainers notes for "Short Course Design"

There is a lot of content in this session. The session should be run in a way that uses a variety of approaches from didactic lectures through activities (e.g. filling in the possible session Aims and Objectives) to time for personal reflection and group discussion.

Session 6: Learning in Groups

Background

> *Session purpose: This session provides delegates with an increased awareness and experience of effective small group teaching.*

Choice of appropriate teaching method is of great importance for ICM training. Trainers of ICM Short Courses, mostly come from academia or tertiary level education, in which the lecture is the dominant form of delivery. However, within ICM training there can be a number of weaknesses apparent in the lecturing mode of teaching:

1. Saying too much too quickly,
2. assuming too much knowledge,
3. forgetting to provide a summary,
4. not leaving time to copy or annotate notes/diagrams etc. from visuals,
5. not indicating reservations,
6. not stressing key points,
7. not linking sections of the talk together,
8. unclear organisation of sections,
9. using too much technical language too quickly, and
10. not linking to other parts of the ICM Course or the case study area.

Even if lecturers pay attention to these aspect of lecture delivery, the basic approach is still found wanting within the context of ICM. This is because in the training environment ICM is carried out in selected groups, as it requires the consistent of input and experience and knowledge of the group members. Moreover, such an approach simulates the real process of ICM, which inevitably involves of team from disparate disciplines and experiences. Consequently, learning in groups is the core of ICM training; indeed, it is one of the features that distinguish it from most higher education in many countries. The development of skills in small group teaching is thus one of the key learning outcomes of the ToT course. The small group teaching method has several advantages particularly for training ICM. Experience shows that during the first week of the training programme, when the knowledge module is being delivered, a blend of **small group teaching** with few experts monologue seems to be more appropriate. In the second week, learning by **case study** and small group approach is found to be very effective. In the third week, dividing the groups into further subgroups and assigning specific tasks in form of deliverables is found to be effective. Thus, throughout the ICM Short Course, skills for working in groups are paramount.

Trainers notes for "Learning in Groups"

It is important that the relevance and context of this session is clear to the delegates. The session covers some basic, maybe even common sense, issues about group work. However, important messages are, firstly, for the delegates to start to think about group dynamics and, secondly, to consider how such group dynamics can be used in their training. It is important to remind the delegates of what they have learnt in this session during the later ToT sessions, particularly Session 8 in which the delegates actually carryout training themselves.

Session 7: ICM Case Study – An Example

Background

Session purpose: To experience a case study in ICM; working in small groups, delegates try to critically evaluate and summarise the ICM plan.

So far in the ToT the delegates have got to know each other, explored the complexities of ICM, been introduced to the ICM Framework, considered styles of learning and course design, and learnt how to manage small group training. Session 7 is the first session in which delegates engage directly with the process of ICM. Although carried out in a training environment, this session tries to imitate some of the complexities of the real world. As discussed in the Session 6, the case study method serves as an important tool for ICM training, and here uses an ICM plan as the basis for a case study session. The proposed case study is based on a real management plan.

In the first section the delegates are tasked with using the case study material to produce a summary review of ICM in relation to accepted good practice. To give a sense of reality, delegates are told they are working for an environmental consultancy company and have to summarise their key points into a one-page fax. This requires considerable negotiation about the text to include, and forces delegates to consider what are the primary issues in the ICM plan.

A short presentation of each group's findings is used for three reasons. Firstly, it is method whereby each group's summary can be quickly communicated to the wider group. This provides the information for the next stage of the session, in which groups compare and contrast their results with other groups, Secondly, the time and single overhead limit bounds the delegates to being clear and concise about the issues surrounding the ICM plan. The third and final reason is to attempt to maintain motivation in the delegates. Requiring a presentation provides a degree of peer-pressure to produce something of suitable quality. In addition, it represents a refreshing change of activity in the session that has been largely facilitator-led introduction and discussions or small group work.

The final stage of the session requires delegates to reflect back on the process and structure of session as an example of running a case study. This is an important component of the session as it requires the delegates to distance themselves from the training that they have just received and to critically reflect back on it as a vehicle for learning.

This is the first session in which delegates are trained about both ICM and training and this distinction, laid out in the objectives, needs to be made clear from the outset to avoid confusion in the delegates.

Trainers notes for "ICM Case Study – An Example"

This session should be taken slowly and carefully. The course notes provided give a structure to the session, however, it is down to the skills of the trainer to ensure that the scoping a key points from the plan are not superficial, but coherent and defensible.

The selection of the case study to use in this session is important. There are many documents available that address planning and management for coastal areas. Not all of these will be presented as ICM plans but may well have a variety of labels attached to them. The criteria to target when selecting an appropriate document is the degree of sectoral focus presented in the plan. For instance, where a strategy for a coastal process (e.g. erosion) and another strategy for a coastal activity (e.g. sand mining) are presented separately, when the issues are interlinked and ought to be dealt with by an integrated approach.

The following section provides guidelines for guiding the delegates through this session. The handout for the trainees has been annotated in shaded text with the main issues and aspects that the trainer must cover in the session. The shaded text provides an insight into the planning and design that has gone into the session.

Background

This ICM plan does not reflect best practise because the information needed was not presented in a manner that was suitable for the decision-makers due to its sectoral focus. The case study approach is the only way of teaching. Firstly, because the aims and objectives of the training can only be met through experience and participation. Secondly, trivial issues, such as providing information in a suitable fashion, are too obvious and likely to be missed. This and similar issues will hopefully emerge from the case study approach, illustrating the fact that seemingly trivial factors can frequently affect multi-disciplinary projects and lead to their ultimate failure.

Timetable Structure

Day 1

09:15	*Lecture on the underlying principles of effective ICM.*
10:15	*Divide class into (sectoral?) groups. Provide delegates with selected case study materials. Brief explanation of materials.*
10.30	*Coffee.*
10:50	*Discussion of TOR and end product (presentation materials).*
11:15	*Group study of materials.*

14:00	*Discuss main issues and problems pinpointed by delegates?**
15.00	*To have attempted filling out of scoping boxes.*
16.30	*To have attempted to fill out best practise boxes.*

Make sure delegates leave the session with suitable materials to enable a presentation to be available the next morning.

Day 2

09:00	*Class presentations.*
10:30	*Coffee.*
11:00	*Comparison of groups and Plenary discussion.*

* times and guidance flexible

Aim

- To critically investigate aspects of the ICM process by an experiential case study.

Objectives

At the end of this session delegates will:

- To have experience in interpretation of ICM documentation, and exploration and identification of key issues.

- To explore the strengths and weaknesses of the Coastal Management process using a case study approach.

- To gain an understanding of the critical areas at which the ICM process may break down.

- To have gained experience in communicating key issues to other professionals.

Critical review of the EIA process and a critical review of the ICM process and Management Plans.

From: Burbridge 1996, UNEP Integrated Coastal Zone Management Training Manual

Literature suggests that the key issues of any ICM plan are:

- A cross-sectoral and inter-disciplinary approach to ICM.

- Clearly articulated development policies and a clear and comprehensible management plan.

- A lead organisation or group to co-ordinate the development, establishment and implementation of ICM.

- Power and resources to implement the ICM plan.

- Stakeholder support and involvement.

- An effective mechanism for co-ordination both horizontally and vertically.

- Institutional capacity for effective implementation of ICM.

- Enhance stakeholder awareness of the benefits of ICM.

The following real-life exercise is designed to assess the ICM plan in to the key issues outlined above.

Scenario

You have been employed to review specific key aspects of an already developed ICM plan. The environmental consultancy that you are working for is tasked to produce a 'fact appraisal report' reviewing the overall adequacy of the ICM plan, highlight key areas of concern requiring further development and outline measures that need to be taken to bring the ICM Plan into line with best practice. **For the exercise you are tasked to produce a one-page fax of bulleted items that you feel are the main issues related to the adequacy of the ICM plan**. These key points will be presented to the wider group in a short presentation.

Circulate around the sub-groups once they start the exercise to confirm that they are all clear on the task and expected outcomes.

Scoping points from the ICM plan

Was the information presented in the plan adequate in its detail and breadth to permit a critical review? *YES*	Reasons COMPREHENSIVE
Was there enough information on the study area to permit an ICM plan to be documented? *YES*	*INCLUDES SOCIAL, POLICY AND LEGISLATIVE AND NATURAL SCIENCE ASPECTS*
Was the information used in the ICM plan presented in a clear and concise manner? *YES*	*COMMON FORMAT OF CHAPTERS*

In summary – there is plenty of information which is presented to draw up a management plan, however, the organisation of the information is problematic – this should be uncovered by the delegates answering the next set of questions.

Key Points from the ICM Plan

Check suitable stepwise progression through boxes by delegates. <u>N.B</u>. DO NOT LEAD TOO MUCH (decide this among Trainers prior to session).

Does the Plan represent a cross-sectoral and inter-disciplinary approach to ICM? *NO – not at all*	Reasons *Impacts on the system (e.g. sand mining, tourism) and processes of the system (e.g. coastal erosion) are covered in separate chapters and the interactions are not considered.*
Are the development policies clearly articulated and is the management plan clear and comprehensible? *NO*	 *No overall plan presented, only sector resource use plans.*
Is there a lead organisation or group to co-ordinate the development, establishment and implementation of ICM? *Partly*	 *There is an organisational entity but it its institutional status remains unclear.*
Were the power and resources available to implement the ICM plan? *NO*	 *Power of Plan Formulation Team unclear – and implementation responsibility not apparent.* *No resource requirement mentioned.*
Was there evidence of stakeholder support and involvement? *YES*	 *Unclear how stakeholders used in plan formulation and implementation.*
Was there an effective mechanism for co-ordination both horizontally and vertically? *NO*	 *Sectoral bias*
Was there institutional capacity for effective implementation of ICM? *Unclear*	
Was there an indication of efforts to enhance stakeholder awareness of the benefits of ICM? *Partly*	 *It was identified but unclear how it was to be operationalised.*

In your role as review consultants, you must communicate your findings to the consultancy that developed the ICM Plan. Prepare a 15 minute presentation covering the key issues identified by the questions above using the one page fax of bulleted points as your only overhead (minimum font size 24).

TRAINER NOTES: ensure delegates are aware that they will only have 20 minutes. Provide overheads and pens etc. Review overhead format and design with regards to prior training. Delegates to select spokesperson/s.

Compare your groups work with the other group(s).

To what extent were the findings of the groups

(a) similar?

(b) inconsistent?

Why do you think that these differences / similarities occurred?

Evaluating the Case Study Exercise

After completing this short case study in ICM it is time to reflect about the session. Fill in your thoughts about the session using the following boxes.

Do you think that the objectives (learning outcomes) of the case study could have been achieved by lectures alone?

Reminder of ICM case study session Objectives:

Experienced structured interpretation of ICM documentation, and explored and identified key issues

Explored the strengths and weaknesses of the Coastal Management process using a case study approach

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Were you able to learn from any failures / omissions in the case study which would have been harmful if you had made the same errors on the real world?

Do you feel you were able to experience the issues and problems faced by workers in sector that is different from your own? Could this help you with interactions with colleagues in the future?

Yours answers will be discussed in a group session once you have finished.

Session 8: ICM Training practice – design, execution, evaluation.

Background

Session purpose: To give delegates an experience of designing, carrying out and evaluating an ICM training session.

This session combines knowledge and skills in both ICM and training derived from preceding sessions and provide delegates with experience of applying what they have learnt. The delegates are tasked to design and carryout a training session in ICM that is evaluated by peer and self-assessment.

It is important that delegates finish the ToT with this session as the application of what they have learnt will help to consolidate the preceding sessions and also give confidence in using the training approach in the ICM Short Course. The session should not be rushed, as time is required for the delegates to develop materials and check back over their notes for ideas and approaches for good practice. The session should be planned to take-up about 12 hours of training, i.e. two days. Ideally, Group A carries out the training after lunch on the first day, and Group B first thing the next morning. It is important that evaluation and reflection is carried out straight after each session.

The trainers running the ToT should keep close observation on the delegates throughout the session design stage. They must guide the delegates so that the training ses-sions are reasonably successful. It is probably not a good learning outcome if one group flounders and produces a poor quality session. Care should also be taken in the post session review of evaluation. The facilitator should ensure an equal balance between positive and negative aspects is made. In addition, it is important that peer- and self-evaluations are used to lead to practical future enhancements of the training session. This will consolidate the link from evaluation back into session design and execution.

The session can be considerably improved though the use of a video-camera or camcorder, if one is available and it is culturally appropriate. A video can be shot during the session and used as part of the evaluation session to show what went well and badly. It is recommended that an experienced trainer carries out the videoing, not for the whole session, but periodically highlighting particular issues e.g. trainees looking bored or not on task, good use of visual aids etc. If the whole video lasts for approximately 10 minutes it can be shown as a whole after the peer- and self-evaluations have been summarized by the two groups, and provide further points for the subsequent discussion. It has always been found that the use of the video helps to heighten motivation with the delegates, which could be very desirable at this stage of the course.

Trainers notes for "ICM Training Practice"

Evidence on the structure of the session is provided in the indicative Course Notes. However, full descriptions cannot be given as the flexibility inbuilt into this session will be required to tailor the session to meet course goals and the TNA conclusions.

Session 1 Course notes – ToT Introduction

This course is not designed to impart a large amount of knowledge on the subjects that will be taught on the ICM short course. Instead it focuses on developing your experience of the methods (and problems) typically encountered in developing and running training courses.

Intended ToT course learning outcomes

The focus will be on specific techniques for designing and delivering effective ICM training, including:

1. methods for effective integration of different disciplinary skills and information in the training programme;

2. methods for identifying materials, information and expertise which would be required to support training objectives;

3. awareness of different learning and training techniques;

4. design of course structures and content to meet specific demands and training objectives;

5. establishing objectives and assessment of progress in meeting objectives;

Although a much more detailed analysis of how we learn exists in educational literature and practice there are some key principles that this course draws upon.

- Learning is fixed or reinforced by **acting in** and **reflecting upon** real situations.

- Reflection is heavily dependent upon **dialogue** for its success (the opposite of dialogue is not monologue, but metalogue - a failure to engage in the terms of the discourse)

- Successful dialogue depends upon **relationship** - with the material, with other learners, with the tutors. Thus the environment and the way the learning is handled is of great importance for success.

Coastal community – Delegates Instruction Sheet

Aims

- To provide a focus on achieving optimum performance as a team by sharing our learning together. It also provides an opportunity for delegates to get to know each other in an informal group exercise.

Objectives

At the end of this session delegates will:

- Increased awareness of collaboration and sharing diverse styles of information in a problem-solving context.

- Appreciated some of the group dynamics concerned with group working, such as verbal communication and division of labour.

Instructions

1. Each member of the task force will receive written bits of information.

2. You have finished the task when the group can tell the facilitator the following information: for each name you must say the type of animal which they keep, the fruit which they grow, their location within the village, their type of house and the type of vehicle which they use.

3. When you and your co-workers feel that the required task has been completed, call the facilitator to check your results.

The following rules will be observed throughout this activity:

- From the moment the task force begins work, members may speak only to their task-force members,

- you may not show others the contents of your written bits of information,

- you may not write anything,

- you must follow the facilitators instructions, and

- in the first instance, you will have 20 minutes to complete your task.

Coastal Community Feedback– (leave space for delegates to write comments)

Please enter below your own comments (particularly regarding your own performance) on:

1. The group process.

2. How effective you were?

3. What you learned about working together effectively to reach a specific outcome, when each person had relevant knowledge?

4. What were the learning factors which helped your team to make progress?

Further discussion points:
- Withholding information.
- One person trying to remember everything.
- The idea of using yourself as a visual aid - arranging everyone in the house positions.
- Listening carefully to data and checking its accuracy.
- The need for responsibility for data, for example remembering everything connected with a particular farmer, or all the details of the animals.
- The issue of communication vs. noise.
- Group management and co-ordination.

Session 2 - Course notes – ICM jigsaw

Aims

- To provide an overview of the many pieces that play a role at some time within the challenge known as "Integrated Coastal Management".

Objectives

At the end of this session delegates will:

- Have understood the problems of integrating the various "pieces" of coastal management and discussed different delegate's opinions.

- Have considered structures for handling these various "pieces" of integrated coastal management.

- Be able to identify priorities in handling these various pieces of integrated coastal management.

Introduction

The terminology of Integrated Coastal Management (ICM) changes with knowledge and fashion. In the course that we are now undertaking, we will be exploring the process of ICM under the three broad headings shown below.

DESCRIPTION OF ENVIRONMENT - What words describe the system that we are trying to manage, the function/s it perform and over what scale, and how is it changing?
INTERACTION OF MAN with the ENVIRONMENT - What words describe the activities of man within the environment and their impacts?
ICM PLAN and MANAGEMENT OBJECTIVES - What words describe mans attempts to determine a plan to manage the coastal environment?

Please note, the above terms do not necessarily represent a hierarchy of considerations or activities. They are merely collective terms for a group of pieces of ICM.

Some of the pieces are provided below. These are not necessarily all the pieces that you will need. Sometimes you may need more, or sometimes less.

Exercise

- Within your assigned groups, consider each of the pieces provided and, based on your collective knowledge assign them to one of the management terms above.

- Between groups, which words have been assigned to all three headings, and which appear against only one or two of the headings? Why do you think this is the case?

The ICM jigsaw pieces:

economic development
heavy industry
social equity
aquaculture
oxygen
participation
pathogens
performance standards
petroleum industries
political motivation
artificial reefs
barrier islands
beach erosion
dynamite fishing
education
sand mining
economic valuation
public participation
rehabilitation
managed retreat
septic tanks placement
setbacks
ecosystems
eco-tourism
economic benefits of protected
areas
motivation
addressing
socio-economic concerns
alternative livelihoods
dredging techniques
protected natural areas
endangered species
management information
agriculture
airfields
alternate livelihoods
shellfish pollution
underwater fishing
institutional analysis
issues analysis
traditional use arrangements
turbidity measurement
traditional uses
training
exclusive economic zone
optimum mix of uses
dimensions of coastal zone
floodlands
historical-archaeological sites
sustainable yield
policy formulation
settlements
shore protection
fisheries
zona publica
settlements
sewage treatment
tsunamis
sea level rise
tourism
sediments and soils

restoration and rehabilitation
genetic diversity
geographic information systems
global warming
regional development planning
remote sensing
research needs
biological diversity
marshlands
mining
multiple use of resources
eco-development
kelp beds
lagoons, estuaries, & embayments
wetlands
pollution control
forest industries
storm surge
subsidence
suspended particulate matter
sustainable use
terms of reference
tideflats
explosives
construction management
coral reef management
green belt
indicator species
industrial pollution
seagrass meadows
infrastructure
sewage management
shoreline construction management
social impact assessment
strategy plan
mining
Ciguatera
CITES
the commons
diversity index
solid wastes
roadways, causeways
littoral drift
waste disposal
legislation
issues analysis
biodiversity conservation
water supply projects
boundaries
coordination
coral reef survey methods
ecologically critical areas
identification
database development
beach fill
beach resources
conflict resolution
coral reef resources
salinity

aquaculture management
awareness
baseline and monitoring
ports and marinas
hinterlands
urban runoff management
water quality management
zoning
pollution
ports and harbours
principles and premises
Ramsar convention
rapid rural appraisal
red tide
mangrove forest management
bridges
exotics
mapping
mitigation
monitoring and baseline
risk assessment
welfare of coastal communities
sustainable use of resources
information needs
eutrophication
international assistance agencies
project review
permits
environmental assessment
electric power generation
socio-economic factors
land use
inlets
cyclones, hurricanes, & typhoons
decentralised management
biosphere reserves
biotoxins
jurisdiction
carrying capacity
nutrients management
ocean outfall placement
project review and permits
watersheds and upland effects
waves
environmental management plan
turtles
protection against natural hazards
multiple use
marine excavation
joint management of land & sea
dredging management
dune management
economic impact assessment
mangrove forest resources
marinas
natural hazards
noise and disturbance
nurture areas
saltwater intrusion
protected areas
information services
environmental audit
toxic substances

Session 3 - Course notes – Introducing the ICM Framework

Aims

- To provide an overview of the ICM Framework and an overview of the constituent elements and the processes involved in moving through the framework.

- To provide a brief introduction to, and experience of, the tools involved in the Framework.

Objectives

At the end of this session delegates will:

- Understood the main elements and links between those elements of the Framework.

- Considered, in a training context, the processes and information required to move through the Framework.

- Understood the concepts behind the use of the ICM Matrix, Stakeholder Analysis, Benefit Cost Assessment and Risk Assessment.

- Gained experience of working through examples of Matrix, Stakeholder Analysis, Benefit Cost Assessment and Risk Assessment.

Introduction

The approach to developing ICM capability and capacity given here is strongly focussed upon the notion that successful ICM requires a method to integrate information from all the sectors and disciplines that have relevance inputs to the formulation of holistic and integrated management responses to coastal issues and problems. In order for you to develop capability and capacity to achieve this, it is necessary for you to have access to:

1. A framework that allows information from the multiplicity of sources to be presented in a non-sectoral manner, and

2. Tools that allows the analysis of information from diverse and different disciplines.

Explanation and guidelines for the use of the ICM Training Framework and the five Tools that have been designed in order to support this process and approach are given below.

Tools 1: How to use the ICM Training Framework

Keywords: ICM Training Framework; Change; Components; Tools; Management.

Learning Outcomes

At the end of this session delegates will:

- Have become familiar with purpose and structure to the ICM Training Framework.

- Have recognised the need to have a common framework to incorporate information from different disciplines and sectors.

Introduction

The purpose of the short course programme is to provide the skills necessary to take part in projects to formulate ICM plans. During the short course a huge amount of information that will come from an equally huge range of sources will be made available, which can be used to gain the understanding and comprehension required to achieve this. The ICM Training Framework provides a structured and sequential guide to both Trainers and Participants through the progression of collecting, collating and analysing information. Supporting the framework is a number of tools that facilitate this process and which are covered in later sessions.

Pathway through the ICM Training Framework

To begin the ICM training process, ToR for an ICM plan relating to the case study area provides goals and objectives against which the learning from knowledge sessions, observations and information gathered during the fieldwork and secondary data can be located. Within the training scenario, additional criteria are set that the goals and objectives should be achieved whilst establishing a sustainable and functioning environment that protects people and property in the most cost effective manner. The participants then sequentially progress through four stages to the ICM Training Framework, which uses the criteria of the ToR to:

- Stage 1 – gather information relating to plan area,

- Stage 2 – assimilate and integrate the information in a non-sectoral fashion,

- Stage 3 – identify management issues and design management options, and

- Stage 4 – evaluate and assess the options against the goals and objectives in the ToR.

This process will sequentially develop skills and approaches for a holistic and integrated approach to the management of the natural resources available in coastal areas and the human activities that exploit these resources. Each Stage is explained in more detail below and the supporting tools identified where appropriate: Detailed descriptions of the tools are given in the session notes for Tools 2 to 5 that follow.

Stage 1: Components and change in the plan area.

It is clear that the management of complex coastal systems subject to significant human pressures cannot occur in the absence of science. The natural sciences are vital to understanding the functioning of ecosystems and the social and economic sciences are essential to compre-

hending patterns of human behaviour. Only by taking into account the interactions and interdependencies among natural resources and different social economic activities can management options to address the changes be found. Scientists and managers often have different perspectives and imperatives – scientists seek to investigate within a numeric and reductionist framework to generate "good science", on the other hand, managers are more concerned with the origins and causes of change that generate issues around over-exploitation, conflict and/or insidious damage based on "best available information" in order to design ameliorating responses.

To achieve this segment of stage 1 of the framework there is a need to avoid description in terms of listing everything that is known but, rather, to develop and demonstrate an understanding of how the system is working in time and space: It is effective to analyse information in terms of:

1. Identifying and characterise the natural and man-made components of the environment in terms of the functions they perform and the scale of their affect. For example, aquaculture in estuarine location affects tidal prism, biological productivity and biodiversity within the boundaries of the estuary; natural (unplanted) sand dune functions as a sediment source/sink and energy dissipation mechanism to the immediate beachfront and hinterland.

2. Analyse and assess data to predicting current changes and impact on each component in time and space, the impact on their environmental functions (present and future) and consequences to users and uses on the coast. For example, aquaculture ponds likely to be abandoned leading to changes in soil chemistry, or sand dunes being planted leading to reduction of function as sediment source and reduced capacity for energy dissipation in a time of increased storm frequency due to climate change). The magnitude and consequences of change must be considered in the context of present conditions and probable future conditions using the best available information. The timeframe for future predictions must be determined by natural environmental conditions (e.g. the probability of extreme events); the built environment (e.g. the probable life span of infrastructures); and political decisions (e.g. establishment of tourism development goals).

3. Identifying the users and uses that are made of the system and their interaction with the system in terms of the variety of communities, market activity and current policy and legislation at local, regional and national level. For example, fisherman, market traders, local subsidies and rules and State legislation.

To ensure that information flowing into the ICM process is relevant to the problem-solving needs of management, the framework requires data to be gathered aligned with:

- The social, economic, political processes that impinge upon component human activities in the plan area, and

- the biological and physical processes that impinge on components of the natural environment of the plan area.

A focus on 'processes' directs information to be analysed against the criteria of change that produces the need for management, and builds-up a picture of the activities and relationships that link together humans and their environment. Tools such as GIS and other modelling methods are likely to be introduced during this stage as a means of gathering, collating and analysing data.

Once information has been gathered and organised as described above, the important components of the plan area, and the significant temporal and spatial changes taking place to them, are identified within the categories of:

- *Coastal environment* – those features of the natural environment that are formed by natural processes (e.g. sand dunes, estuaries), and those changes over which humans have no influence or control (e.g. storms, sea level rise[1]).

- *Land use* – those features of the hinterland landscape (e.g. forests, agriculture) and changes to them that originate through modification by human activity (forest clearing, agriculture to aquaculture). Note that land use types can be 'natural' (e.g. forests) or man-made (e.g. aquaculture).

- *Ports* – identification of the different types of structure associated with navigation activity (e.g. beaches, harbours with retaining walls) and changes in activity associated with navigation activity and structures (e.g. dredging, cargo pollution risk).

- *Industry* – identification of industrial activity and structures that exist within the plan area (e.g. tourism, power station) and changes in these activities and practices (e.g. expansion of manufacturing industry).

- *Housing and infrastructure* – identification of the different types of housing structure (e.g. brick/concrete, traditional/rural, urban) and infrastructure for service provision (e.g. roads, sewage facilities), and changes in their configuration (e.g. temporary to permanent housing, no sewage facilities to septic tanks/mains).

Precise or scientific derivation of terms used in this definition, such as "significant" and "important", is not useful and probably impossible. However, these terms can be practically negotiated and defined in a manner that promotes cross-disciplinary understanding.

Stage 2: Determining the impact of change.

It is likely that a change in any given component of the system will have an impact on other components of the system. For instance, a change in the sediment regime in an estuary is likely to impact the viability and working of a port upstream. The multiplicity of components and their associated changes within even a small plan area are likely to be many leading to a complex situation where identification, and prioritisation, of those changes upon which man-

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[1] Although aspects of some changes may be viewed as originating from human-induced change, the consequences are beyond the control of any human intervention.

agement should be directed may be obscure. This stage introduces three tools that aid delegates in this decision making process:

1. **Stakeholder assessment** that provides an insight into the major socio-economic drivers operating at the local level and also allows an assessment to be made of the relationship between the relative influence and importance of stakeholder groups with the intended outcomes identified in the ToR.

2. **Interaction matrix** that provides a means to explore the interactions between the main components of the biological, physical and human environment and their expected changes, as well as providing a structure for the prioritisation of information and ensuring discussions become clearly directed and non-sectorally entrenched.

3. **Stakeholder matrix** that provides an overview of the impacts on people of future changes in the coastal area.

Stage 3: Identification of key issues and management options.

The completed Stakeholder Matrix is used to interpret the relationship between stakeholders and changes in the plan area, and identify the key issues for management activity. The position on the matrix where stakeholder impacts occur provides insight into the cause of impact, i.e. driven by future natural change or industrial change; this has management connotations as the former cannot be ameliorated. In addition, particular interactions can be identified which impact upon a number of different stakeholders. These interactions deserve special attention, either to maintain if the impact is positive, or to ameliorate if impacts are negative.

Identification of management options should be arrived at through negotiation and consensus. Using information gathered during Stage 1 promotes an inter-disciplinary dialogue through understanding of the scale of influence of components of the system and the hazards associated with changes taking place. Criteria against which options should be formed are to achieve a balance between economic development and environmental sustainability in order to enhance economic, environmental and social capital.

A central issue of all management plans should be to achieve sustainable resource management of the environment. To this end, there are three major objectives that underpin any option:

- A sustainable environment,

- Minimising risks to people and property, and

- Minimising costs to sustain development.

The outcome of management options should be environmental resource development that is integrated into a dynamic and natural system without loss of the resource or functional integrity of the environmental system. This stage should not seek to identify a single 'preferred' option but identify the full array of management options that could address the identified issues. An option might consist of a single management intervention (e.g. relocation of vulnerable communities away from hazard zones) or a suite of complimentary management

interventions (e.g. early warning system; construction of cyclone shelters; rehabilitation of buffer ecosystems (i.e. mangroves); and relief management in response to storm hazards).

Stage 4: Evaluation of management options.

Each management option should be assessed to explore whether it mitigates the identified risk associated with changes and its cost effectiveness in order to determine its likely implementability. This stage reinforces the principle that ICM attempts to reduce the risks of hazards on people and resources at least cost. Three tools are used in order to arrive at a judgement on each management option:

1. **Options matrix** – Each proposed management option, if implemented, will effectively impose a 'new' change on the plan area, and therefore its impact can be explored through the Stakeholder Matrix to produce an Options Matrix. Management options which impact on a wide range of components require carefully consideration by exploring whether the management change produces interactions that did not exist previously and/or target those interactions that affect stakeholder groups.

2. **Risk assessment** – Minimising risk to people and property is one criterion that has been identified as goal of an ICM management plan. This mismatch between scientific risk and risk perception by stakeholders can have a significant impact upon the implementability of management options from technical and societal perspectives.

3. **Evaluation of associated benefits and costs** - A simple framework to enable a basic and subjective assessment and comparison of the benefits and costs associated can be used to evaluate the various management options for a particular issue.

The final step of Stage 4 is to evaluate the outputs from these three tools against the original ToR of the plan in order to assess the overall implementability of the management option and whether it should be recommended to decision makers. Each management option can be judged in terms of:

- Its success in ameliorating issues, meeting the ToR whilst not generating 'new' management issues – Option Matrix,

- Its success in reducing the risk to people and property from hazards – Risk Assessment, and

- Its success in generating benefits relative to costs to identified stakeholder groups – Evaluation of the benefits and costs.

It is unlikely that any single option will emerge as clearly superior over other options in all categories. For instance, some options may be relatively inexpensive to implement but have a low impact on the desired outcomes set out in the ToR, whilst others may be expensive but essentially meet the stated ToR. In addition, an important consideration when evaluating options is the extent to which they may produce new interactions within the plan area components that may impact the stated policy parameters. However, the outputs from these three tools are accountable and defensible and form a basis for discussion with decision makers.

Tools 2 - The Interaction Matrix

Keywords: Matrix; Components; Changes; Stakeholders; Interaction; Management Intervention; Significant Impact.

Learning Outcomes

At the end of this session delegates will:

- Have gained a basic knowledge on the structure of the ICM Matrix and an awareness of the selection of Sub-Components and Changes.

- Become competent in the positioning of stakeholder groups in the Stakeholder Matrix and using these matrices to assess possible future stakeholder's impacts.

- Be aware of how to use the Options Matrix to test and refine proposed management interventions.

- Have gained awareness about the benefits and problems associated with using the Matrix as a tool in ICM.

Introduction

The Matrix is used as tool to support the delegates at critical stages in the Framework of ICZM. Within the training course the Matrix is a tool which provides:

1. A structure for the consolidation and integration of information collected at the earlier stages of the Framework.

2. A tool for orientating group discussion around key aspects of the ICZM process.

The Matrix was developed because delegates can experience "information overload" and find it difficult to identify, and concentrate on, important information for the ICZM process. The Matrix helps to avoid focusing only on few limited sectors of interest to particular individual disciplines. In addition, group discussion with delegates on coastal problems, impacts upon stakeholders and potential solutions frequently became far reaching, sectoral and well beyond the scope of the plan, even with strong arbitration. The Matrix has been found to provide a structure for the prioritisation of information and also to ensure discussions become clearly directed and non-sectorally entrenched. One further benefit of the Matrix approach is that decisions are accountable as the Matrix provides the evidence that supports the decision, that helps to move solution decision away from the "expert mystic" to a consensus group outcome.

The Matrix sequentially develops as the delegates move through the Framework and appears in the Framework in three different forms:

1. Interaction Matrix – this represents the interaction between the main components of the biological, physical and human environment and the expected changes in the physical and human environment.

2. Stakeholder Matrix – the structure of the Matrix is the same, however interactions that result in an impact upon stakeholder groups, identified from the Stakeholder Analysis, are highlighted.

3. Options Matrix – this Matrix is also similar in structure and involves the introduction of suggested management options, determined from the expert committee exercise, as further changes in the matrix. The impact of these management derived changes on stakeholder groups can then be assessed.

Examples of the three forms of the matrix used in the training short course are given below.

Whenever the Matrix is used in a training environment it must be clearly articulated that it is a tool for directing group discussion and solution formulation, and that it does not provide a "magic algorithm" for ICZM. In addition, it should also be stated that the Matrix is only as good as the users, consequently for effective execution, an enabling environment that promotes the input of the knowledge and experience of all the group members should be promoted.

Using the Matrix as a training tool

The Matrix always has a common structure in that Components are placed as column headings and Changes as row headings (Figure 1). Components are defined as natural or human-made physical entities of the target area which are important features of the coastline. Changes are defined as significant changes occurring, or expected to occur within the ICM planning horizon, which impact significantly on people or coastal resources. Precise or scientific derivation of terms used in this definition, such as "significant" and "important", is not useful and probably impossible. However, through use of the Matrix these terms have been

		Components				
		Coastal Environment	Land use	Ports and Harbours	Industry	Housing & Infrastructure
Changes	Coastal Environment					
	Land use					
	Ports & Harbours					
	Industry					
	Housing & Infrastructure					

Figure 1. Format of the basic matrix.

found to become practically negotiated and defined within the group in a manner that promotes cross disciplinary understanding. It should be remembered that the Matrix is a tool for use driven by group expertise and common values.

Both Components and Changes have a consistent sub-structure: Coastal Environment, Land use, Ports and Harbours, Industry, and Housing and Infrastructure. Housing and infrastructure involves small-scale construction and infrastructure for service provision.

From the information collected and reviewed in the earlier stages of the Framework the delegates can be led to define a number of Sub-Components within the five set categories and a range of Changes within the same categories. The distribution of Sub-Components and Changes within the categories might well not be even, and some categories might well be empty for some coastal areas. Thus, it is not a requirement to have equal numbers of sub components and changes. Some Sub-Components, or Changes could occur in more than one box (e.g. a forested sand dune system: sand dune or forestry): in this case a pragmatic decision should be made by the group. For use as a decision support tool in a training environment, it has been found that approximately 20-30 Sub-Changes and 20-30 Sub-Components provides a useful and pragmatic form.

Once the Sub-Components and Changes have been identified by the group, then the group determines the Interactions between the Changes and the Components as a thought experiment. Interactions are recorded where they are defined as significant effects of a Sub-Change on a Sub-Component. Again the definition of "significant" is based on the value system of the group and is also related to the Terms of Reference of the plan. To identify the Interactions requires the effect of each Change to be assessed on each Sub-Component. If the change is considered to be "significant", that is the change is of a sufficient magnitude and consequence that it requires consideration within the ICZM plan, then a tick is placed in the appropriate box of the Matrix.

Each possible interaction within the matrix is visited and a similar thought experiment is carried out. It is advisable to do this in a number of groups and then once the Interaction procedure has been carried out, to compare the Matrices and discuss the differences to an extent that one form of the Matrix is accepted by all groups for further analysis at a later stage. Some delegates may feel that to be quasi-quantitative, Interactions could be denoted as a plus or a minus, or scaled by magnitude e.g. a scale of 1-5). However, this does not improve the value of the model as a training tool, consequently such notations have not been used.

The placement of Interactions on the Matrix provides a concise summary of the information collected and collated during the earlier stages of the Framework, but also provides a degree of broad interpretation of the dynamics of the plan area. For example, if many of the Interactions are related to Changes associated with the Coastal Environment, then this suggests that the many of the changes in the Components are being driven by natural environmental change. This means that these major drivers might not be able to be modified by human intervention, but the consequences of this change have to be reduced. On the other hand if the

Sub-Changes in the Industry category are affecting many of the Components, then it suggests that industrial activity is the prime driver of change, in this case management could be more related to changing the drivers through intervention (e.g. through cleaner technology, mini-mising further industrial expansion etc) rather than coping with the consequences. Close consideration of the emerging properties of the Matrix has been shown to provide delegates with an improved, and sometimes a more subtle awareness, of the dynamics of the coastal system that they have been tasked to manage.

Ensuring rationality in the use of the Interaction Matrix

The simplicity and degree of subjectivity involved in using the Matrix can create problems among delegates. Many delegates might be from academic institutions, and generally with a natural science background, consequently such subjectivity and value laded activities can be alien. The desire for quantitative and objective tools remains strong; although such tools are available they are discipline specific and cannot be fashioned to accommodate the wide realm that the ICZM philosophy encompasses. Until an objective and quantitative framework can be produced, which permits a wide range of information types and quality from all sectors involved in coastal management, which is holistic and accountable, then such tools as the Matrix need to be used. In addition, even if a scientific framework could be constructed, it is unlikely that this could be used in a short course training program which requires delegates to progress through all the stages of coastal management in a short period of time.

The stages to complete an Interaction Matrix can be summarised as:

1. Identify the Sub-Components,
2. identify the Changes, and
3. denote significant interactions on the Matrix with a tick.

Figure 2 shows a completed Interaction Matrix for a low-lying coastal area in Bangladesh. This Matrix exercise was carried out by a group of water engineers, facilitated by trainers. It should be noted that some of terminology of the Sub-Component and Change terminology was not that which would have been selected by the trainer, however this terminology was agreed by the delegate group and thus accepted.

| Changes | | | | | | | | | | | |
| Housing & Infrastructur | Industry | Ports and Harbours | Land use | | | Coastal Environment | | | | | |
More Houses			More nat. resource exploitation	More agriculture	More wells	Siltation	Accretion	Erosion	Cyclones	Sea level rise		
				☺:					☺:		Dry flood plain (>2m)	Coastal Environment
			☺:	☺:			☺:	☺:	☺:	☺:	Wet flood plain (<2m)	
							☺:	☺:	☺:	☺:	Shoreline	
						☺:			☺:	☺:	Creeks	
			☺:			☺:	☺:		☺:	☺:	Mangroves	
			☺:								Forestry	
☺:					☺:		☺:		☺:		Agriculture	Land use
						☺:				☺:	Aquaculture	
											Ponds	
											Kitchen gardening	
											Animal sheds	
									☺:	☺:	Wells	
			☺:			☺:			☺:	☺:	Fishing harbour	Ports and Harbours
									☺:	☺:	Jetty	
											Saw Mill	Industry
☺:									☺:		Houses	Housing & Infrastructure

Figure 2. Example of an Interaction Matrix from a low lying coastal area in area in Bangladesh.

Guidance for completing the Stakeholder Matrix

The Interaction Matrix is involved with the interaction between physical Components of the coast and Changes in those components. Although many of the Sub-Components are related to human activity (e.g. ports, housing etc), the next stage of using the Matrix is to identify the relationship between the Interactions and the stakeholders. Within the training framework, the main group that are considered are the primary stakeholders, as these groups are most heavily reliant on the target coastal area and affected by changes. However, it is possible also to involve secondary and key stakeholders in this stage of the Framework.

The first stage of completing the Stakeholder Matrix is to identify the primary stakeholders from the Stakeholder Analysis carried out within Tools 3: Stakeholder Assessment (p.74). Within the training it might be advisable to identify the most important or vulnerable stakeholder groups and concentrate the analysis on these groups.

The next stage involves selection of one group of primary stakeholders and then sequentially going through each Interaction on the Interaction Matrix and identifying if this particular interaction has a significant impact upon the Stakeholder group. Again the use of the term "significant" must be used in a practical sense and include a valued-laded and consensus-orientated perspective. On the Matrix, Interactions which would be expected to have a significant impact upon the identified stakeholder group within the planning horizon of the plan are modified from a tick to another symbol representing the stakeholder group. Within the Matrix, it should be remembered that only those boxes which have a significant interaction are considered in relation to stakeholders, not all of the Sub-component and Change possibilities.

This process is repeated for all the targeted stakeholder groups and through this process a number of Stakeholder Matrices are developed.

The Stakeholder Matrix can provide an overview of the impacts of future changes in the coastal area. If many of the Interactions are expected to have a significant impact upon a stakeholder group, for instance the tick has been changed to a stakeholder symbol, then impact upon the stakeholders will be great. On the contrary, if few or no changes are made to the Matrix for a stakeholder group, then the impact stakeholder group will be minimal. At this stage stakeholders are considered to be impacted by Interactions - no discrimination is made in the Stakeholder Matrix between change for the better of the stakeholder groups, or a change for the worse at this stage. However, it is worth recording the reasons for linking a stakeholder with an Interaction.

The Stakeholder Matrix can be used to interpret the relationship between stakeholders and changes in the target coastal area. The area of the Matrix in which the stakeholder impacts occur provides insight into the cause of impact, e.g. driven by future natural change or industrial change, this has management connotations. In addition, particular Interactions can be identified which impact upon a number of different stakeholders. These Interactions deserve special attention, either to maintain if the impact is positive, or to ameliorate if impacts are

negative. In a workshop environment, it has been found useful to use overhead overlays for different stakeholders.

Two example Stakeholder Matrices are presented in Figure 3 for two primary stakeholder groups in Bangladesh – landless people who are moving into newly stabilised low-lying coastal areas and fisherman who live on the more stable higher-level areas. From the distribution of the stakeholder symbols it can be seen that there are a number of features that distinguish between the stakeholders. Clearly, consideration of the differences between these two stakeholder groups needs to be made within the ICM plan. The Stakeholder Matrix can provide a concise and coherent summary of the association between stakeholder groups and the dynamics of the physical environment. The Stakeholder Matrix is taken forward and used to orientate the discussion which will lead to selection of possible management options.

Legend: B = black face (in-migrating landless people), R = red face.

Component	Sea level rise	Cyclone	Erosion	Accretion	Siltation	More wells	More agriculture	More nat. resource exploitation	Ports & Harbours	Industry	More Houses
Housing – Houses		B									B
Industry – Saw Mill											
Ports & Harbours – Jetty	B	B									
Fishing harbour	B	B		B				B			
Land Use – Wells	B	B									
Animal sheds											
Kitchen gardening											
Ponds											
Aquaculture	B			B							
Agriculture		R		B			B				R
Forestry								B			
Environment – Mangroves	B	B		B	B			R			
Creeks	B	R		B							
Shoreline	R	R	R	R							
Wet flood plain (<2m)	R	R	R	R			R	B			
Dry flood plain (>2m)		B					B				

Figure 3a. Example of Stakeholder Matrix for in-migrating landless people (faces symbol) in a low-lying coastal area of Bangladesh.

			Changes								
Housing	Industry	Ports &Harbours	Land Use			Environment					
More Houses			More nat. resource exploitation	More agriculture	More wells	Siltation	Accretion	Erosion	Cyclones	Sea level rise	
				☻:					☻:		Dry flood plain (>2m)
			☻:	☻:			☻:	☻:	☻:	☻:	Wet flood plain (<2m)
							☻:	☻:	☻:	☻:	Shoreline
						🐟			☻:	🐟	Creeks
			☻:			☻:	☻:		☻:	🐟	Mangroves
			☻:								Forestry
☻:					☻:		☻:		☻:		Agriculture
						☻:				☻:	Aquaculture
											Ponds
											Kitchen gardening
											Animal sheds
									☻:	☻:	Wells
				☻:		🐟			🐟	🐟	Fishing harbour
									🐟	🐟	Jetty
											Saw Mill
☻:									🐟	Houses

Right-side bracket labels: Environment (Dry flood plain → Mangroves); Components; Land Use (Forestry → Wells); Ports & Harbours (Fishing harbour, Jetty); Industry (Saw Mill); Housing (Houses).

Figure 3b. Example of Stakeholder Matrix for fisherfolk (fish symbols) from a low-lying coastal area of Bangladesh.

Guidance for completing the Options Matrix

The third form of the Matrix used in the ICM Framework is the Options Matrix. The Options Matrix acts as a check, filter or enhancement mechanism for suggested management options. The inputs into the Options Matrix are the proposed management options derived from the Option Formulation box in the ICM Framework.

The Options are added to the Interaction Matrix as another category of change. The added rows of management changes are filled in by ticking significant Interactions with Sub-Components (Figure 4). The number of significant Interactions provides information on the consequences (both positive and negative) of following the management option over the planning horizon. An Option can be composed of one or more interventions. If a number of management interventions are proposed, then it may be best to repeat the process with a single or small number of related interventions on separate Matrices. This means that a complex Option, which involves a number of interventions, could be described on a small number of Matrices. For example, one Matrix could display the significant impacts of fisheries management (increasing fuel subsidies, decreasing net size, protection of waters from illegal fishing) and another Matrix could display the impact of sustainable tourism management (levy bed tax, improve transport infrastructure, daily cleaning of beach and promenade cleaning). In this case the variety of interventions have been grouped into two areas, fisheries and tourism development, and the impact of these changes can be identified on two Matrices, which considered together, give information about this management Option. Whatever the complexity of proposed interventions, at this stage of the ICM process, management options which impact on a wide range of Sub-Components should be carefully reconsidered.

The second stage of the Options Matrix involves assessing the effect of the proposed options on the stakeholders. Again, selected stakeholder groups, usually primary, can be used in a training environment. For each row of significant Interactions caused by proposed management interventions in the Matrix, a further identical row is generated below the first. Each significant Interaction on this new row is assessed as to whether the Interaction caused by the proposed intervention will significantly impact upon the selected stakeholders groups.

Interpretation of the Options Matrix allows the impact of proposed management on stakeholders to be determined. Some of the impact will be positive, however, it is likely that impact upon some stakeholder groups for some management interventions will be negative. If there are many negative Interactions associated with stakeholders, then the management intervention should be questioned. To try to minimise negative impact and maximise positive impact on stakeholders, the Options Matrix should now be used in an iterative way. Modifications can be made in the proposed interventions to try to maximise positive aspects to stakeholders. Consequently, the Options Matrix can be used to check for stakeholder benefit from proposed management options, filter out options which have strong negative impacts on stakeholders and also to enhance management options to maximise stakeholder benefits.

Changes

	Management				Housing	Land Use			Environment						Components
	Embankment-S3 – aquaculture	Embankment-S2 - fisherfolk	Embankment-S1 - landless	Embankment	More Houses	More nat. resource exploitation	More agriculture	More wells	Siltation	Accretion	Erosion	Cyclones	Sea level rise		
			⚠	☹			☹					☹		Dry flood plain (>2m)	Environment
	♁		⚠	☹		☹	☹			☹	☹	☹	☹	Wet flood plain (<2m)	
										☹	☹	☹	☹	Shoreline	
	♁	🐟	⚠	☹					☹			☹	☹	Creeks	
						☹			☹	☹		☹	☹	Mangroves	
						☹								Forestry	
			⚠	☹	☹			☹		☹		☹		Agriculture	Land Use
	♁		⚠	☹					☹				☹	Aquaculture	
			⚠	☹										Ponds	
														Kitchen gardening	
														Animal sheds	
												☹	☹	Wells	
		🐟		☹		☹			☹			☹	☹	Fishing harbour	Ports & Harbours
		🐟		☹								☹	☹	Jetty	
														Saw Mill	Industry
			⚠	☹	☹							☹		Houses	Housing

Figure 4. Example of an Options Matrix showing the impact of the construction on landless, fisherfolk and aquaculture stakeholder groups.

Tools 3: Stakeholder Analysis

Keywords: Interests; Influence; Primary Stakeholder; Secondary Stakeholder; Key Stakeholder; Focus Groups; Data.

Learning Outcomes

At the end of this session delegates will:

- Have understood the significance of stakeholder analysis in the planning process.

- Have discussed basic approaches to information collection for socio-economic analysis during and after the fieldwork.

- Be familiar with a basic stakeholder analysis tool and understand how they will use it during option formulation and report writing during the course.

Introduction

Analysis of the socio-economic dimension needs to be done both quantitatively and qualitatively in ICM. Stakeholder analysis can be used as a tool to summarise the groups of people with an interest or stake in changes and interventions on the coast. Such an exercise provides an insight into the major socio-economic drivers operating at the local level that need to be considered in order to arrive at options for mitigating effects coastal problems. It is also expected to highlight which stakeholder groups will influence any planned intervention positively or negatively and to begin to provide insight on how conflicting interests can be resolved through participation and negotiation.

The stakeholder analysis is required to assess activities of the people in the coastal area under consideration. It helps identify and prioritise different groups of stakeholders likely to be affected by the changes in the physical, biological and human components of the coast. It enables a focus on the primary stakeholders likely to be significantly affected by the current and anticipated future changes in coastal components as well as any planned interventions.

Conducting a stakeholder analysis involves determining the geographical dimension of the plan, the scale of social and economic considerations congruent with the plan horizon, and then determining the methods to be used for

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When to use stakeholder analysis for ICM

In **Identification**, the purpose is to undertake preliminary identification of key stakeholders. Here, it is important to identify important and influential stakeholders and decide how to involve them in design and appraisal.

In **Design and Appraisal**, undertaking detailed Stakeholder Analysis, involving all key stakeholders, is used as a basis for design and risk analysis.

At **Inception**, Stakeholder Analysis is used to plan the involvement of different stakeholders in starting up the activity.

At **Implementation**, Stakeholder Analysis is used as an *aide-memoire* to ensure the effective involvement of key stakeholders who support the programme, and to monitor key stakeholders who are opposed to it.

At **Evaluation**, it is important to review any analyses undertaken, and use them to plan the involvement of different stakeholders in reviewing and evaluating the activity.

the identification and categorisation of the stakeholders in the coastal area under consideration. Information may be obtained from secondary documentation (e.g. through census data or existing local reports and study data) complemented by primary data obtained through fieldwork involving survey instruments and key informant interviews. Interviews are conducted to elicit information regarding the stakeholders' views in relation to how their interests are likely to be affected by the intervention.

Stakeholders are identified with reference to the objectives of the problem and/or planned intervention. Identification of primary, secondary and key stakeholders in the field is important in the first stage of plan formulation in order to assess the importance and influence of the different groups.

Outline of Content

This session of the short course is primarily concerned with introducing stakeholder analysis as a tool to apply during the case study work. However, the basic concepts and principles of stakeholder analysis that a coastal manager would need understand and apply in order to evaluate the outcomes of various intervention options are covered. Organising the content around the following themes will help provide an overview of stakeholder analysis and prepare the delegates for the case study work.

Ideas for the Content

Focus on explaining the aim of a stakeholder analysis:

We are primarily concerned with identification of those interests and groups which will be or are being affected by the planned intervention, whether plan, project or policy.

Different groups have diverse economic, social and political interests associated with resource use in the coast. Coastal managers need to understand who the 'users' of the coastal resource are and the dimensions of their interests in particular 'uses' of the resources of a locality. Different stakeholders have different interests in relation to the exploitation of a particular resource.

Stakeholder analysis is a tool which seeks to provide information with which planning may be better managed. The analysis proceeds from the recognition that even if all the actors in a

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Relevance of stakeholder analysis to environmental or natural resource management problems experienced in coastal areas

Stakeholder analysis provides insight into a number of important issues:

- The boundaries of natural systems cut across social, economic and political units, making it likely that a large number and variety of different stakeholders will be involved with problems and solutions.

- Coastal problems are frequently associated with externalities, costs borne by stakeholders other than the decision-maker, so need to be looked at holistically if progress is to be made in addressing the causes and consequences.

- Many natural resources are held as common property or open access with multiple users.

- Temporal trade-offs between present and future uses of natural resources are important.

- Natural resources may have competing incompatible uses and/or user groups.

plan share the same broad objective (for example, to produce a sustainable pattern of exploitation of the fishery), there are likely to be, for each stakeholder, more detailed interests and objectives underlying this. Clarifying what these different detailed objectives might be for each category of actor, and then considering the extent to which these objectives can be made more consistent with each other, is a key part of effective policy management.

Highlight the techniques used to identify the stakeholders:

In order for planners and implementers to be effective they should be expected to be aware of who the cast of stakeholders are likely to be. However, assembling this cast list can entail a range of different methods of inquiry. These can range from the formal to the informal. This can range from: direct observation; the use of secondary documentation; group consultations; surveys; and semi-structured interviews. Note that the short course will require the delegates to engage with various forms of data and to interview key informants at the case study site.

Describe the approach to stakeholder analysis used in the short course:

Identification of Stakeholders: A review of documentation and key informant interviews are important first steps. The purpose of these is to gain an oversight of the sectors we are concerned with in terms of ICM and the associated issues. This review should also identify the main stakeholders, given the objectives of the intervention. (for example, if the main issue is depletion of fish stocks then an intervention will seek to reduce fishing effort - so which stakeholders are going to be effected by that?). See Box 1 and 2 for a list of question areas for use during review of documentation and in interviews.

Box 1. A checklist of what to find out from stakeholders	Box 2. Points to remember for a semi-structured interview
What are stakeholder's expectations of the plan?	Use a checklist to guide the interview
What are the likely benefits or costs to stakeholders?	Be sensitive and respectful to all involved
What resources will the stakeholders commit (or avoid committing) to the planning process?	Listen and learn
	Ask open-ended questions Use: Who? What? Why? When? How? to form questions.
What other interests do the stakeholders have which may conflict with the planning process?	Probe responses carefully
How do stakeholders regard other stakeholders?	Judge responses. Are they facts, opinions or rumours?
	Verify findings through triangulation
	Record responses and observations fully

Categorisation of stakeholders: Once a list of stakeholders has been generated, it is common to have systems of categorisation. These are rough and ready, but can be useful as a starting point of analysis. For example;

- **primary**: those ultimately affected by the plan. These people may be affected positively (beneficiaries) or negatively (e.g. people displaced by an infrastructure project).

- **secondary**: those involved in the delivering the plan (e.g. government departments, NGOs, officials of aid agencies, etc). This would include both those who are involved in decision-making in the planning/policy process and those who may have been excluded from it.

- **key**: those who may be indirectly affected by the plan, but who may exercise a large degree of influence which can affect the intervention (e.g. powerful economic interests outside the coastal zone, but nevertheless dependent on activity in it, international conservation authorities).

Mapping importance and influence: It is useful to use a tool in order to visualise the relationships of stakeholders to each other (see Figure 1 for an example). The initial categorisation of stakeholders as primary, secondary and key seeks to assess the centrality of the stakeholders to the plan, however it is also useful to assess both their importance in respect of the policy objectives and the amount of influence that different stakeholders can bring to bear on a planning process. Using a simple matrix to locate stakeholders can help the analysis.

The vertical axis of the matrix ranks stakeholders in terms of their 'importance' to the planning process while the horizontal axis ranks the amount of 'influence' they may bring to bear. In this diagram, 'importance' is different from the initial categorisation exercise of primary, secondary and key. By 'importance' what is meant is the extent to which the needs and interests of a particular group of stakeholders are regarded as a priority by the primary planning agency (for example, a coastal zone plan could be directed by a general government injunction that planning should seek to benefit (and not harm) the poorest groups, where possible).

> **How do we elicit the views of stakeholders at the case study site?**
>
> Having identified the different stakeholders, it is then necessary to begin to elicit their views on how they believe their interests will be affected by the intervention.
>
> *Key informant interviews* may be a useful way to begin this process. A small purposive sample of the population of stakeholders can be drawn-up and interviews conducted accordingly. It is important not just to accept what key informants may say about the ways in which other stakeholders will be affected.
>
> *Focus groups:* Where the stakeholder population is large (e.g. numbers of fishing households) it may be possible to hold group meetings of these particular stakeholders. Using a focus group methodology, this may help identify a range of different views of effect and also improve the analysis of the effect. However, care should be taken in using a focus group methodology that differentiation within the stakeholder population does not result in the 'voices' of some being heard more clearly than others.

Documenting the analysis: While the list of stakeholders developed and the influence-importance matrix provide a useful summary of findings at the case study site, emphasis

should be placed on the need to make notes of discussions in order to record the analysis of the conflicts and contradictions between the stakeholder group interests and there relation to the problem areas.

This will assist report writing when analyses of the changes in the environmental components due to the activities of the stakeholders and the impact of changes in the environment on different stakeholder groups have to be identified and prioritised.

Concluding points:

This tool is intended to improve the formulation and implementation of plans. In practice it can be used in the participatory development of coastal projects and programmes and is a useful management approach to be used throughout the project cycle.

In the context of the training course the identified stakeholders and their relationships with the physical and biological components will be incorporated using the interaction matrix tool.

Further Reading

Britha Mikkelsen (1995). Methods for development work and research: A guide for practitioners. Sage Publications India Pvt. Ltd., New Delhi. ISBN 81 7036 458 2.

Jules N. Pretty, Irene Guijt, Ian Scoones and John Thompson (1995). A trainers guide for participatory learning and action. IIED Participatory Methodology Series. International Institute for Environment and Development, London. ISBN 1 899825 00 2.

On-line reference material

L. Bunce, P. Townsley, R. Pomeroy and R. Pollnac (2000). Socioeconomic Manual for Coral Reef Management. Australian Institute of Marine Science. Townsville, Australia.

http://www.aims.gov.au/pages/reflib/smcrm/pdf/smcrm-2000.pdf (for the whole document) (15Mb) or http://wcpa.iucn.org/biome/marine/socioecon.html (to download by section). A useful manual with clear descriptions of ideas and tools that can be adapted to other coastal contexts where reefs are not found. The sections on tools including stakeholder analysis can be used to inform the design of lectures and the principles underlying the approach to field work can be used to inform the way the case study module on the course is conducted.

DFID, 2002. *Tools for Development: Chapter 2, Stakeholder Analysis.*

http://62.189.42.51/DFIDstage/FOI/tools/chapter_02_frame.htm or the whole *Tools for Development: A manual for those involved in development activity* can be downloaded from:

http://62.189.42.51/DFIDstage/FOI/tools/tools_pdf/DFID_ToolsforDevelopment.pdf.

DFID, 1993. *Note on Enhancing Stakeholder Participation in Aid Activities,* available at http://lead.virtualcentre.org/en/dec/toolbox/Refer/sddstak3.pdf.

DFID, 1993. Guidance Note on how to do Stakeholder Analysis of Aid Projects and Programmes, London, DFID. http://lead.virtualcentre.org/en/dec/toolbox/Refer/sddstak1.pdf.

	A		B

High Importance→

▪ **Landless Households**

▪ **Agricultural farmers**   ▪ *NGOs*   ▪ *CBOs*

▪ *Forestry Department*

▪ **Fishers**

▪ *Assistant Commissioner-Land*   ● *Local Council*

▪ *Fish Traders*
▪ *Public Health Engineering Department* ▪ *Water Development Board*

▪ *Local Government Engineering Department*

▪ **Poor women**

▪ *Department for Women Affairs* ● *Livestock Department*

▪ Ministry of Land
▪ Government & Co-operatives

● *Agricultural Extension Department*

▪ Ministry of Livestock *Co-operatives Department* ▪ Ministry of Water Resources

▪ Ministry of Local Government & Co-operatives

▪ **Illegal land**
▪ **occupiers**

▪ *Education Department*

● Ministry of Education

● Local MP   ▪ **Agricultural busines smen**

←Low Importance

C			D

← Low Influence   High Influence →

KEY: **Bold**   *Italics*   Underlined

Primary Stakeholders   *Secondary Stakeholders*   Key Stakeholders

Tools 4 - Risk Evaluation

Keywords: Hazard; Risk; Vulnerability; Risk Evaluation Matrix.

Learning Outcomes

At the end of this session delegates will:

- Gained insight into the importance of carrying out an evaluation of risks in the context of preparation of an ICZM plan.

- More aware of nature and types of risk resulting from activities in coastal zones.

- Gained confidence in the use of an approach for carrying out a risk evaluation technique.

Introduction

Risk is a factor involved in every decision that we make, from crossing the road to undertaking coastal protection measures. It is important that this concept is introduced within the decision making process involved in coastal management. As the ICM framework presented in this manual suggests, risk is one criterion that decision makers should use to arrive at a decision about the relative merit of each management option available to them.

Risk is pervasive at all stages of ICZM, and risk management is a key objective of ICZM, it is not a simple concept to incorporate for two main reasons. Firstly risk is difficult to measure scientifically, especially within the ICZM framework, in which systems can be highly dynamic and unpredictable, and when proposed interventions can be diverse and involve a wide variety of sectors and be inherently difficult to "value" in economic terms. Secondly, risk perception by individuals and communities is ingrained within the functioning and cultural values of their society and may not entirely confer with a scientific assessment of risk. This mismatch between scientific risk and risk perception by stakeholders can have a significant impact upon the implementability of management options from technical and societal perspectives.

Within this course it is not possible for delegates to carryout a comprehensive risk assessment. However, it is important that some basic concepts about risk are covered as this can help delegates to interpret risk analysis in the future. It is suggested that during the course a simple risk analysis matrix is used to convey these key concepts.

Outline of the Content

This session covers the basic concepts and principles of risk assessment that a coastal manager might need to apply in order to evaluate the merit of various intervention options and advise decision makers. The content is largely conceptual rather than quantitative; this is because of the importance of understanding concepts as opposed to engaging in the details of risk analysis methodologies.

Ideas for content

What are the core concepts of risk?

The definitions of hazard and risk are fundamental:

- Hazard – an event or process with potential for harm to people, property and the environment.

- Risk – the probability of a hazardous event occurring.

However, risk in environmental management must go beyond the scientific concept of risk (risk assessment) and involve societal aspects (risk evaluation). In ICZM risk should be considered as a culturally-framed concept ingrained within the functioning and cultural values of society.

What types of risk are there in an ICZM context?

There are 3 types of risk:

- Risk from factors under your control (e.g. ineffective management systems, poor performance by contractors).

- Risk from factors from the wider institutional and policy environment which are in control by remote decision makers.

- Risk that is essentially uncontrollable (interest rates, political instability, natural disasters).

Identification of the different types of risk can help to identify management options.

In what way can a manager respond to risk?

There are three generic approaches to dealing with risk:

- Transfer – risks can be transferred, for example through conventional insurance or through third party involvement, such as a Federal Ministry devolving responsibility to a State Ministry.

- Tolerate – if it is not possible do anything about risk, or relationship between benefits and costs prohibits taking any action, then a certain degree of risk may have to be tolerated, e.g. natural disasters.

- Treat – in many case it is possible to decrease the risk through selected actions, such as constructing coastal protection. However, it is rare that risk can be entirely eliminated.

The options available to a manager in order to respond to risk can be related to the type of risk.

How can risk be measured?

As risk is largely a cultural, rather than a scientific, value it's measurement is difficult. If risk is to be measured then three components of risk need to be identified:

- The hazard occurrence probability – the likelihood of a hazard occurring.

- The elements at risk – an inventory of the people and infrastructure which might be affected by the hazard.

- The vulnerability of the elements – the degree of impact that the elements would experience at different strengths of hazard.

It is the combination of these three components that allow assessment of risk to be carried out. These components mean that risk can occur on a variable scale from a high frequency - low impact hazard, to a low frequency - high impact hazard; such differences will enable development of management strategies.

How can risk be managed?

Within ICZM the risk management process usually has 4 key stages:

1. Scoping and investigation,

2. Analysis,

3. Implementation,

4. Monitoring.

However, it has been found that a key element to facilitate this process is the role of risk perception and communication, consequently this process should involve stakeholders and communities at all stages. This should inform the non-expert public perception of risk in a two-way exchange between experts and public/ stakeholder representatives.

A simple tool for risk assessment

Risk assessment methodologies tend to be very complex. However, the risk evaluation matrix (Figure 1) can be used to support the assessment of management options. The matrix divides risk into the probability of the hazard and the impact of the hazard (i.e. the scope of elements at risk and their vulnerability to the hazard). The risk matrix can be used to document evaluation of risk before and after an intervention takes place. By putting a range of alternative management options into the matrix, an evaluation of the relative risk can be made and management options compared.

This tool can be used in the reporting stage of the short course to help describe the effects of the options indemnified to address the key issues observed at the case study site. The delegates can consider the risk associated with the hazard under present conditions (i.e. doing nothing to resolve the key issue) and then evaluate whether their proposed intervention will reduce probability of the hazard occurring and/or reduce the impact of the hazard.

		Impact		
		Low	Medium	High
Probability	Low	1	2	3
	Medium	2	3	4
	High	3	4	5

Figure 1. Risk Evaluation Matrix.

Exercise

Examples can be used to ensure delegates are confident in the concepts associated with this Risk Evaluation Matrix and show delegates how a number of management techniques can be used together to manage risk.

Example 1 – oil terminal protection: A coastal oil terminal experienced considerable oil spill events during the offloading of tankers due to pipe coupling failure, consequently it undertook two risk management measures:

1. Improved "clean" offloading technology

2. A trained oil spill containment team on permanent "standby".

The situation prior to undertaking such measures was medium impact-medium probability (3). The "clean" offloading technology could reduce the probability of the impact but not the magnitude of the spill if it occurs (low probability-medium impact; 2). The containment team would reduce the impact of the oil spill by stopping the oil spreading over the surrounding coastline, consequently, this would lead to a medium probability-low impact situation (2). In the risk management plan, both techniques are used together consequently the outcome is low probability and low impact (1).

The diagram below can be used to visually display the risk management effects:

		Impact		
		Low	Medium	High
Probability	Low	1	2	3
	Medium	2	3	4
	High	3	4	5

Example 2 - cyclone management in Bangladesh: The 1991 cyclone in Bangladesh killed an estimated 135,000 people, destroyed 1 million homes and considerable infrastructure, total economic impact of the cyclone was estimated to be US$2.4-4.0 billion. Following this Bangladesh has developed a cyclone risk management program. The program has three components:

1. Cyclone warnings
2. Shelter construction and evacuation to shelters
3. Disaster relief

Assuming that the situation prior to the cyclone management program fits into the medium probability-high impact box (4), then delegates can be asked what is the affect of each individual component of the program, and the overall impact. On its own cyclone warning does not affect risk unless appropriate action is taken. Shelter construction and evacuation procedures can lead to a decrease in impact of the cyclone magnitude (medium probability-medium impact; 3). Disaster relief can also help to decrease the impact of the cyclone (medium probability-medium impact; 3). All three techniques together can prove effective in reducing the cyclone risk, moving the risk towards a medium impact-low impact box. It can be noted that after the 1991 cyclone, 64% of people questioned said that they had taken precautionary measures after hearing the warning, such as moving to cyclone shelters.

Tools 5 - Assessing benefits and costs

Key Words: Benefits; Costs; Social; Economic; Environmental; Assessment; Valuation.

Learning Outcomes

At the end of this session delegates will:

- Have reviewed the basics concepts underpinning an assessment of benefits and costs.

- Be familiar with a simple tool to assess cost and benefits as part of the analysis to be used in the case study to test the implementability of selected solution options.

Introduction

When developing ICM plans and especially in relation to hard engineering options, delegates may come across cost-benefit analysis. Cost-benefit analysis is widely used because of its flexibility and broad applicability to analyse the costs and benefits of a range of interacting environmental, social and economic impacts. Cost-benefit analysis compares the present values of all social benefits with the present value of opportunity costs in using resources.

An analysis of costs and benefits has three basic steps – quantity description of inputs and outputs, estimation of social costs and comparing benefits and costs – once the project and the management options have been specified. In the short course we will not have the information nor, perhaps, the expertise to hand that would enable the delegates to take part in a proper cost benefit analysis. Instead, we will describe the simplified activity that the delegates will complete to look and cost and benefit issues. It draws on some of the ideas and concepts in formal cost-benefit analysis, but should not been seen as synonymous.

In the context of the training a simple framework for guiding course delegates' assessment is used. It take a very simple approach to comparing the costs and benefits associated with the options selected by the delegates during the case study and provides a rough and ready understanding of the process of weighing benefits and costs for decision making.

Outline of the Content

A simple framework (Figure 1) to enable a basic and subjective assessment and comparison of the benefits and costs associated can be used to evaluate the various management options for a particular issue the delegates have identified in their fieldwork. The assessment is used to identify who will benefit and who will lose and, to indicate the type and scale of the costs and benefits in the proposed options and the alternatives. The procedure is to firstly to consider the associated economic, social and environmental costs associated with changes for each solution option and the short and long-term consequences for society of existing trends in the condition and use of the coastal resources. Secondly, consideration is given to the social, environmental and economic costs and benefits that stem from each of the management options (this should include a 'do-nothing' option). For the purposes of the tool, the relative size of the costs and benefits are considered and assigned relative values that act as proxies for the real values. The idea is to score the benefits and costs in relation to their relative magnitude.

	Benefits		Costs	
	Item	Size of Benefit	Item	Size of Cost
Economic				
Social				
Environmental				

Figure 1. Template for the Benefit Cost Assessment Exercise

Ideas for Content

Introduction to assessing costs and benefits

The cost and benefit assessment tool has a role in providing an input into the decision making process in terms of relatively large changes which are under consideration. Simply speaking is an appraisal of benefits and costs; if benefits exceed costs, the project is in principle acceptable. Otherwise, it is not. In the real world the decision is made in the context of predetermined investment criteria and in relation to the payback period and thus the internal rate of return. However, for this exercise any judgements in these areas will be purely based on the delegates' subjective analysis.

Emphasise that a prime requirement is the integration of economic, social and environmental values into the assessment. This is especially important in ICM, where the interplay of these factors is critical. Valuation and assessment can be used to identify who will benefit and who will lose and to show the costs and benefits of the proposed options and the alternatives.

Explain that in practice, most resource allocation decisions are made on socio-political grounds, but the valuation of natural resources and associated social and economic assessment can be an important input into this process. They are steps toward informing the political process to reflect the informed preferences of the population.

Describing the benefit and cost assessment tool

The major focus of this session is the explanation of a basic tool that the delegates can use during the short course to think through the cost and benefit issues. There the following stages to using the tool which need to be explained with the use of a worked example:

- **Review** of the information each group has on biophysical changes observed at the case study site and the associated economic, social and environmental costs associated with these changes for each solution option.

- **Identification** in relation to each solution option selected for the case study site – the short and long-term consequences for society of existing trends in the condition and use of the coastal resources.

- **Identify and name** the social, environmental and economic costs and benefits that stem from various options. For each option – including the 'do-nothing' option – complete the benefit and cost assessment template. Note that it may not be possible to assign cost and benefit items to all the cells in the template. This is acceptable.

- **Valuation**: Consider the relative size of the costs and benefits and assign relative values that act as proxies for the real values. The idea is to score the benefits and costs in relation to their relative magnitude.

- **Option Comparison**: The template for comparing the benefits and costs contains space for considering economic, social and environmental costs in a basic manner.

Notes on the Benefit Cost Assessment Tool

As part of reviewing the solution options delegates need to consider the associated economic, social and environmental benefits and costs. The initial task is to list the goods and services. For this training exercise, these are defined as: -

Valuation	Definition	Examples
Economic	The net positive or negative change associated with factors that have defined market monetary values – these can be goods and/or services.	Income of stakeholders New expenditures Damage to infrastructure Changes in supply and demand factors
Social	The net positive or negative change livelihood[1] status of households.	Underemployment or Unemployment Changes in health status Loss/gain of educational opportunities Loss/gain of community support networks – i.e. through force migration due to the construction of a power station
Environment	The net loss or gain of environmental goods and services which may impact on economic and social aspects now or over the length of the planning horizon.	Loss of mangrove areas Degradation of soil quality Changes in biodiversity – elimination of a fish species

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Example assessment of benefits and costs

A worked example is included below. This can be used to illustrate this briefing session. Use it to explain the process required for the analysis and reporting module of the short course. Ensure that guidance on the number of solution options that could be tested during the as-

sessment and report writing of the plan for the case study site is provided. It is suggested that this should be limited to a maximum of four. It is important that the option of 'doing nothing' is included as one of the options in order that the current situation can be compared with each suggested solution options. In addition provide a reminder and clarification of the links with the risk evaluation exercise.

Example of a worked assessment

Identified Issue: A fishing harbour is silting up and will close in the short term.

On the coast of Anyland, the creek on which a fishing harbour is situated is silting up. This has been caused by changes in the size of the inter-tidal area due to the construction of

1. Solution Option: No intervention (Harbour silts up)

	Benefits		Costs	
	Item	**Size of Benefit**	**Item**	**Size of Cost**
Economic	Increase in income of beach seining	Minor	Closure of the harbour and write off of the investment	**Major**
	Increase in income of inshore fishermen	Minor	Ice factories close as reduced business	**Major**
	Operating costs of trawlers saved due to on harbour closure	**Major**	Small traders supplying fishing services close or relocate	Minor
	Sale of trawlers	Minor	Aquaculture production decreases due to increase in disease as water quality declines	**Major**
			Salt pan production decreases as salinity declines	Minor
Social			Unemployment/ Underemployment of trawler crews	Minor
Environmental	Pollution from the port stopped	Minor	Reduced tidal flushing resulting in species changes	Minor
	Recovery in offshore fish stocks	**Major**		

2. Solution Option: Dredging (to keep harbour operational)

	Benefits		Costs	
	Item	**Size of Benefit**	**Item**	**Size of Cost**
Economic	Fishing revenue from trawlers and income to crews	**Major**	Operating costs of dredger	**Major**
	Allied industries to fishing maintained	**Major**	Declining income of beach seining & inshore fishermen	Minor
	Aquaculture production maintained	Minor	Costs of operating and commissioning trawlers	**Major**
	Salt production continues	Minor	Harbour depreciation	Minor
Social				
Environmental			Declining fish stocks and diversity.	**Major**
			Localised pollution in harbour area	Minor

3. Solution Option: Inter-tidal de-reclamation (to keep harbour operational)

	Benefits		Costs	
	Item	**Size of Benefit**	**Item**	**Size of Cost**
Economic	Fishing revenue from trawlers and income to crews	**Major**	Reclamation re-construction & land purchase	**Major**
	Allied industries to fishing maintained	**Major**	Declining income of beach seining & inshore fishermen	Minor
	Inshore fishing enhanced	Minor	Costs of operating and commissioning trawlers	**Major**
			Harbour depreciation	Minor
			Aquaculture production lost	Minor
Social				
Environmental	Development of mangrove systems – biodiversity.	**Major**	Declining fish stocks and diversity.	**Major**
			Localised pollution in harbour area	Minor

ponds for semi-intensive shrimp farming. The fish industry is locally important. However the expansion of the number of trawlers is affecting the catches of inshore boats and from beach seining. There are a number of allied small-scale industries that provide goods and services to the fishing fleet. After studying the site, a group of coastal managers conclude that in a relatively short time the harbour will cease to operate as the trawlers will relocate to other ports up and down the coast. They want to compare the costs and benefits of the closure of the port with two solution options they have identified - the dredging of the channel in the creek up to the harbour and the reclamation of the inter-tidal area by removing the shrimp farms.

Session 4 - Course notes – Model and styles of learning[1]

Aims

- To provide an awareness of the diversity of learning styles and techniques that promote learning and to consider how these may be used in the context of the ICM Short Course.

Objectives

At the end of this session delegates will:

- Be aware of the diversity in learning styles within the training environment.

- Have developed an appreciation of the theory of the learning process and an awareness of the stages of the learning process and how they form the learning-cycle.

- Be aware of the differences between surface and deep learning.

- Have considered how the learning cycle can be utilised in course design.

Please spend about 10 minutes thinking about what goes on mentally when you yourself learn. Try to go further than simply describing what an outsider would observe you doing whilst learning.

> What do I mean by learning? (Use the 'Learning to…' prompts below to assist you if you wish).
>
> Learning in my discipline.
>
> Learning to drive a car *or* to play sport/music.
>
> Learning to teach or train others.

Please spend a few minutes noting down what it is you are doing when you teach, relating your response to your understanding of the learning process described above.

Diversity within learning

> By teaching I mean…

Learning can be conceived as:

- An increase of knowledge,

- memorising,

- acquiring facts or procedures which are to be used later,

- abstracting meaning, and/or

- understanding reality by an interpretative process.

---

[1] Leave space in handout for delegate's comments in the boxes.

Approaches and Styles

Delegates come to learning tasks with different intentions and this can determine the *approach* they take to the given task. This may be apparent to you from the varying nature of the responses trainees make to learning tasks you have given them. In addition, they can be observed to have *preferences* and *styles* in the way that they learn.

This variety of learning styles, if teaching is limited and inflexible, can impede the acquisition of understanding. Trainees that we may characterise as 'good' or effective learners will probably be more flexible in their use of styles and have been described as *versatile* learners.

Deep and Surface Approaches to Learning

Two approaches to Learning:

- **Deep**   intention is to understand.

- **Surface**   intention is to memorise/reproduce.

Learning	Deep Approach	Surface Approach
Indicators	*focus on content as a whole* *try to see the connections* *think about structure as a whole* *try to get the meaning of*	*focus on elements of content* *try to remember as much as possible* *try to learn it off by heart*
Outcomes	*meaning / understanding*	*rote learning / memorising*

It is not in general an easy matter to determine a trainee's approach, for example from written output or delegates personal notes. It is usually necessary to ask them about what they were trying to achieve, and what they were thinking about.

Categorise the following examples as deep or surface approaches:

I don't like having to take notes in during lectures. I would prefer to concentrate on understanding. I like to be able to listen so I can understand what the problem is.

I learn coastal geomorphology by cases: listing cases and listing principles. I have a good short-term memory and when I was a student I memorised enough to get through exams.

There is a lot of meaning behind it. You have to really kind of get into it and take every passage, every sentence and try to really think, "Well, what does this mean?" You mustn't regurgitate just what the trainer says…

Holist and Serialist Styles of learning

Two particular styles of learning, depending on the learner's predilection for procedure and stepwise assembly of knowledge, or for the 'big picture' at an early stage have been characterised. Some learners may have a combination of both styles; this means that they are *versatile.*

Serialist:

- Step-by-step approach,

- aided by rules and algorithms,

- follow procedures, and

- lack of awareness as to 'why' and 'how'.

Holist:

- Global learners,

- get overall picture,

- see relationship, and

- make intuitive jumps to conclusions.

Learning Preferences

In terms of teaching activity, some learners have a series of preferences in the way in which they learn. Knowing this might be helpful in designing some teaching situations. These preferences in the way that delegates learn can be summarised as:

- Visual.

- Aural.

- Reading and Writing.

- Kinaesthetic.

Models of learning

Kolb: Experiential Learning Cycle:
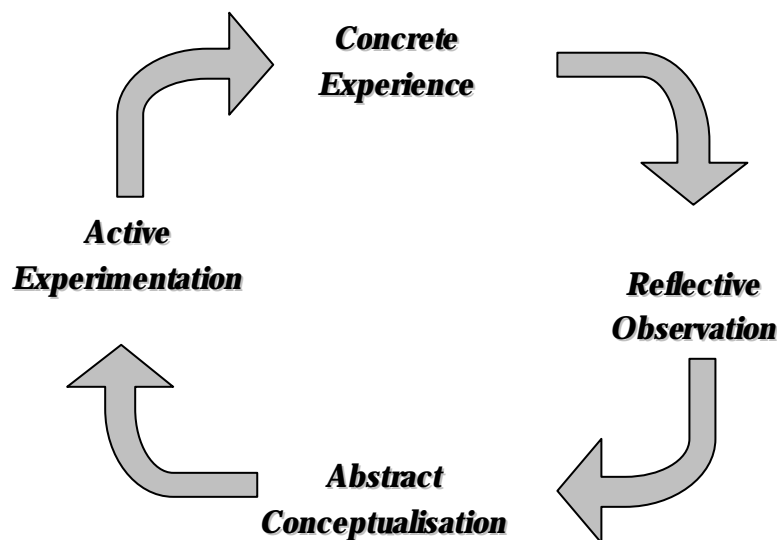
Race: An Alternative Model of Learning
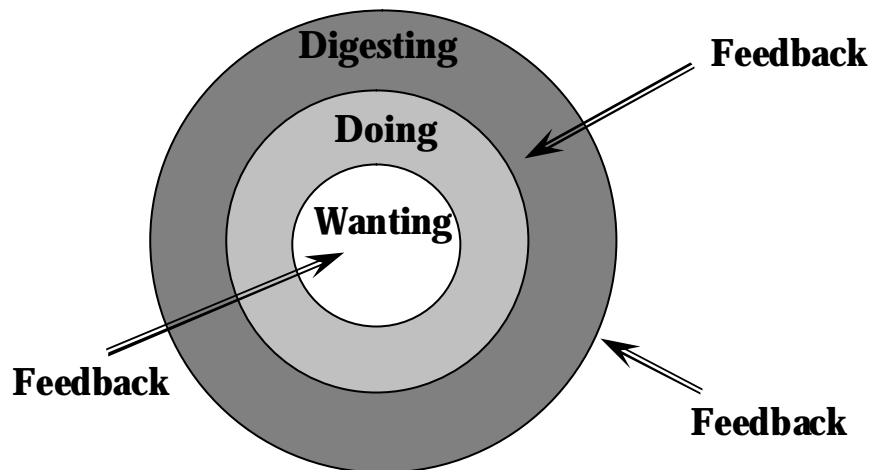
Outcomes of learning – the Solo Taxonomy

It has been suggested that learning can be categorised into five levels, as illustrated below. The headings above the columns indicate the evidence provided by trainees' work of learning outcomes in terms of understanding. Achievement of the highest level of competence in which separated aspects are integrated which allows a higher level of understanding is pa r-ticularly relevant to the context of ICM.

Five Structural Levels of Learning Outcomes
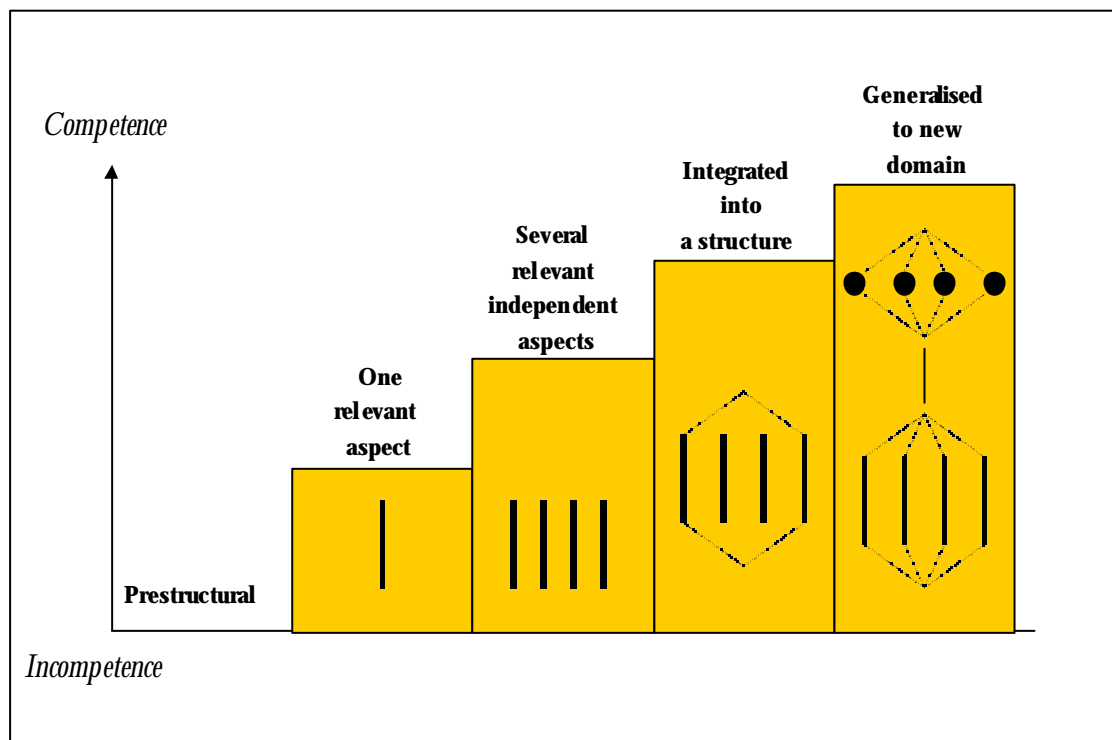
Course Design and Learning

Using your own experience as learner and as teacher, consider which features of course or module design would tend to ***discourage*** a deep, transformative approach to learning.

> Features of course design which might discourage deep learning.

Course Design and Approaches to Learning

Considerable research has been expended in trying to link features of courses with the approaches to learning taken by trainees. A wide range of studies, have lead to the summary conclusions below:

Characteristics of Courses Associated with a Surface Approach

- a heavy workload,

- relatively high contact hours,

- an excessive amount of course material,

- a lack of opportunities to pursue subjects in depth,

- lack of choice over subjects and over the method of study, and

- a lack of clarity and consistency over the type of learning required of trainees.

Meanwhile, this body of understanding also points out more directly four key features of learning experiences which are necessary to support a deep approach to learning.

Fostering a Deep Approach

Feature	Comments
Motivational context	ownership through involvement in planning and meaningful tasks
Learner activity	doing worthwhile tasks AND planning, reflecting on and processing them so as to relate them to abstract concepts
Interaction with others	negotiation of meaning and manipulation of ideas with others
A well-structured knowledge base	tasks must effectively use existing knowledge and experience

Personal summary – reflection on Trainees learning

> I feel the most significant features of trainees learning which I either know or have come to think about are…
>
> I think that I might be able to promote deep learning by…

Session 5 - Course notes – Short Course Design

Aims

- To gain an overview of the training need analysis, and course/module design process
- To identify and express the purposes of programmes of training and the contributions that individual components make
- To review approaches to setting and wording outcomes (aims and objectives) for programmes and components
- To decide on appropriate evaluation methods

Objectives

At the end of this session delegates will have improved awareness and a functional understanding of:

- Course design models, particularly the model used for this course.
- The rationale for a course, including issues of prior trainee experiences.
- The value and purposes of aims and objectives.
- Setting aims & objectives.
- Intellectual demand and generic skills.

Training Needs Analysis

Success of any training programme largely depends on the proper assessment of the training need and capacity of the training team to meet the demand. Thus it is an interactive process, which, if undertaken prior to designing the course module, can improve the outcome. The following model considers the basic steps necessary to carryout out a training needs analysis fro skills, knowledge and ability (termed SKA in the model).

The Basic Model of Training Needs Analysis

Step 1	Define deficiency.
Step 2	Prioritise deficiencies with regard to: Goals, availability of resources and probability of success
Step 3	Personal analysis: study the trainees personal SKA.
Step 3	Job environment analysis: assess the SKA requirement for the job
Step 3	Work environment analysis with regard to motivation and opportunity to overcome deficiency.
Step 4	Possible suggestion to address the SKA deficiency
Step 4	Possible suggestion to modify work environment

The above model seeks to identify the training that is required in a situation by asking, first, "What is it that we are unable to do?" Once that is formulated in a useful way, it is possible to consider (Step 2) which of the problems (there are invariably several) should be addressed to provide the maximum benefit to the organisation(s) considering running training. The complexities of a thorough organisational analysis are beyond the scope of this course, but the main thrust of this stage may be achieved using the relevant strategic planning document(s) and consultation with appropriate senior staff. Careful consideration should be given to the quality and realism of documents which may be used as a basis for training.

The third step looks at what needs to be done within/around the defined (or proposed) role for success. The three elements, of the **role** itself, the **person or people** intended to carry it out, and the **environment** in which it is to be undertaken, all need to be taken account of if there is to be a convincing decision to undertake training or to try to modify the organisational environment to mitigate the problem.

However, although meeting training needs is important, trainees also have personal expectations of the course. Ideally, these should be aligned with the conclusions from the training needs analysis, however, this might not be the case. If there is a discrepancy between the training needs and the trainee's expectations then it is important that this is considered in the course design. The compromise should attempt to keep the delegates satisfied that the course is meeting their expectations, whilst ensuing that the training needs have been met.

Course design: overview

There are many ways to design (and refine) courses. In effect the course designer/evaluator is seeking answers to the following eight questions:

1. What are we planning to do?
2. Why are we planning to do it?
3. What content will be needed to achieve it?
4. How are we planning to do it?
5. What support will the learners need?
6. How will we know it works?
7. How will we manage the process?
8. How might it be improved?

Various models have been devised and the template adopted here has 8 key features:

- Rationale - value added/fitness for purpose/fitness of purpose. This depends on the training needs analysis.

- Aims and objectives - the intended learning outcomes.

- Content to achieve the aims/objectives, including how it is structured.

- Teaching/learning methods to provide appropriate experiences for trainees. This includes the instructional strategy employed.

- Assessment to measure outcomes of learning.

- Evaluation to see whether the assumptions about the other seven features were valid.

- Environment - resources & trainee support.

The relationships between these features are shown by:
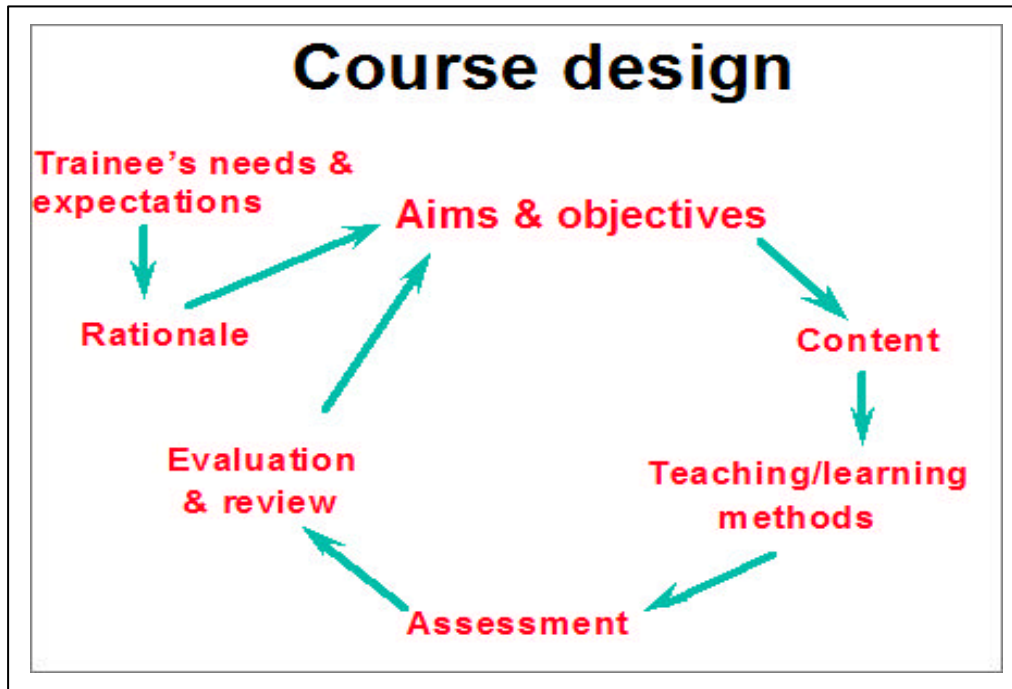
Sources of input into the training course curriculum

A number of approaches (it may be necessary to combine a number of these for a comprehensive picture) have been identified as ways of deciding what needs to be included within the curriculum:

Approach	Description
The "wise persons" approach.	*The senior players (academics, practitioners, researchers) in the field.*
A study of errors in practice.	*Where mistakes have been made because those trained were ill-informed or misinformed.*
Critical incident studies.	*Where new situations have arisen and people did not have the skills and/or knowledge to cope.*
Task analysis of established 'practitioners'.	*Cloning the skills and abilities of workers in the discipline.*
Analysis of existing curricula.	*Following, or building on, what other course providers do.*
Views of those trained recently.	*Checking what more recent course participants have found necessary and valuable.*

For an effective course it is usually best to use a number of these approaches to identify required inputs. Using a number of approaches also allows triangulation between suggested sources of input from different approaches.

> **Please think about each approach and think of possible sources of information that could be used in an ICM Short Course:**

Aims and objectives

The purpose of Aims and Objectives

The principal benefit of defining aims and objectives - goals, learning outcomes, call them what you will - is the provision of **guidelines and a common understanding** by course providers (lecturers/teachers/trainers) for course takers and 'users' (trainees & employers) **of what is to be achieved**.. Aims and objectives provide trainees with a guideline of their trainers' expectations and also provide an idea of the standards demanded of them. It is important to ensure that aims and objectives are understandable to the delegates as they represent the primary indicator of what the delegates should be concentrating their learning on.

Writing aims and objectives is not an exact science. The idea is not to distil the outcomes of the training/education into a list of competencies or lowest common denominators. Studying cannot, and should not, be prescribed to the last detail. However, when designing our courses we must have a set of expectations and standards in mind. Writing aims and objectives simply makes these expectations and standards explicit. A cautionary note, however - beware making claims and demands that cannot be substantiated. For example, a claim that trainees will gain a particular range of skills may look good on paper, but it needs to be happening 'on the ground' as an effective part of the course as well.

Aims and objectives - distinction

Aims are **broad and general** statements of educational intent, and should inform trainees of the **overall** purpose of a programme or module. They are often written in provider (lecturer/tutor) rather than receiver (trainee) terms, i.e. "the aim of this session is to provide….".

Objectives, on the other hand, are more focused and **indicate what trainees should be able to do at the end** (which is why they can be also termed learning outcomes) of the session or programme. They may refer to subject specific concepts and skills, or more general (transferable / generic) attributes and abilities. Whatever they are, they should be **written in trainee rather than lecturer terms**. Objectives are characterised by being:

S   pecific   *detail about particular aspects of expectations.*
M   eaningful   *in language that is understandable to trainers & trainees.*
A   ppropriate *'fit for purpose' - suit learners and satisfy standards.*
R   ealistic   *given time constraints, resources etc.*
T   estable   some measure of progress/achievement of them can be made.

The hierarchy of aims and objectives

Objectives should map into aims and vice versa.

Identifying ICM training opportunities in India: an example of aims and objectives;

Aim   To identify and assess ICM needs and issues at local, regional, national and international levels.

Objectives   By the end of the module, trainees should have:

- Improved awareness and understanding of the process of identifying training opportunities.

- Identified further training opportunities within [Country/Region].

- Established requirements for training to meet the needs at each level.

- Reviewed existing and planned in-country training programmes.

- Reviewed capacity to provide training in required areas.

- Assembled a Summary Report during the session, which will describe the rationale and intended learning outcomes for a number of potential ICM training courses in [Country/Region].

Relationships between levels of aims and objectives should be apparent. Session objectives should map into course aims, which are encompassed where appropriate by programme objectives. The higher level aims of the course should map be directly linked to conclusions from the Training Needs Analysis.

Objectives checklist

As a simple check on the 'validity' of an objective, it is worth asking six questions:

1. Does the objective focus on what the trainee will be able to do, as opposed to what the teacher will do?

2. Does the objective emphasise the outcome of learning rather than how the learning will take place or what the course content might be?

3. Is the phrasing of the objective clear, so that the learner has a clear sight of the goal?

4. Does the statement take account of the trainees and the expected standards?

5. Are the resources and support systems available?

6. Is there a means by which progress towards or achievement of the objective can be measured?

In effect - are they SMART?

Your own aims for training courses

Think of one or more training sessions which you might carryout on the ICM Short Courses and suggest aims and objectives for the session(s).

Aim:

Objectives which will meet the above aim:

1

2

3

4

Aim:

Objectives which will meet the above aim:

1

2

3

4

Assessment – the principles

Introduction

Assessment is in the spotlight and it is vital for us to have a good knowledge and understanding of the subject and the issues. **How shall we know someone successfully completing our training programmes?**

The aim of this session is to briefly summarise some of the relevant principles and issues in assessment. This should provide a background to the more specific context of the development of the training programme for the future.

Why Assess?

The requirements of delegates can be for a number of reasons:

- To certify whether the trainee has reached a particular level or standard.

- To describe what students know or able to do.

- To assist learning.

- To improve teaching by indicating its effectiveness and to make adjustments to your modules.

- To satisfy stakeholders.

In the ICM Short Course this might be for a number of reasons, such as to ensure the delegates are reaching a certain standard and to satisfy certain stakeholders, such as the funding organisation.
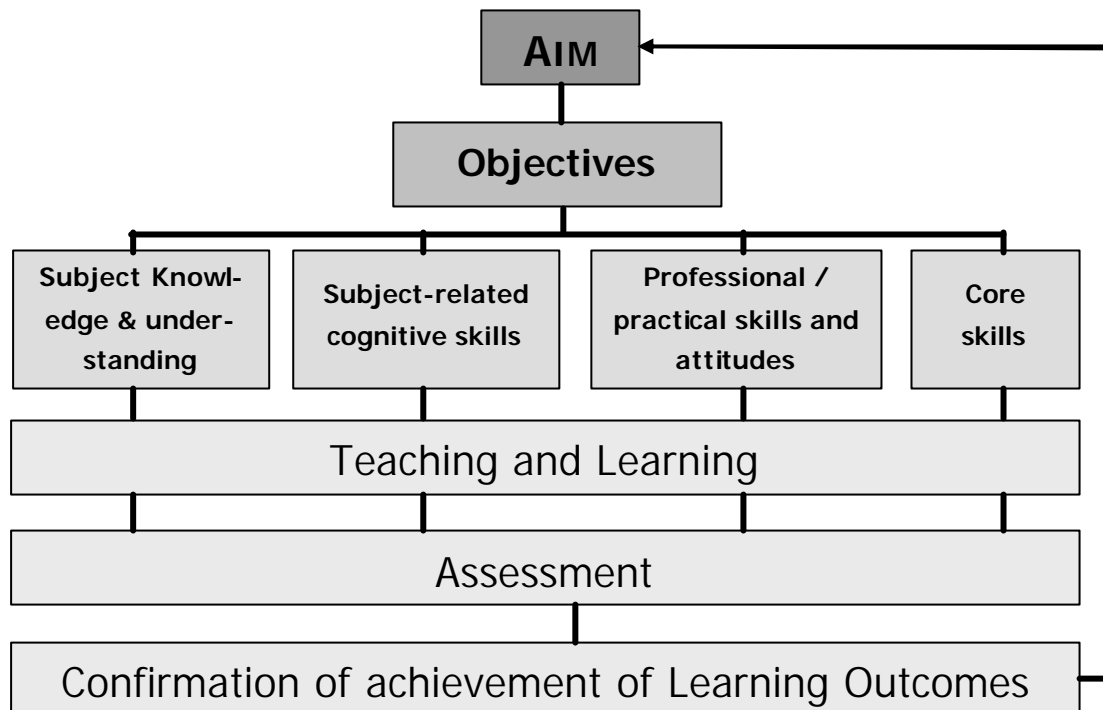
What Do We Assess?

While the above explain why we assess at all, they say nothing specifically about what we seek to assess. Assessment is centred on a number of themes:

- That all educational provision has a purpose or aim defined as a general statement of what can be expected of the students who successfully completes it,

- that this aim can be broken down into a set of objectives or specific **intended learning outcomes**, and

- that these intended learning outcomes can be classified into four broad categories, namely;
  - subject knowledge and understanding,
  - subject – related cognitive skills,
  - subject-related practical/professional skills and attitudes, and
  - core (potentially transferable) skills.

Assessment can help to ensure:

- That teaching and learning is designed to give delegates the opportunity to achieve these intended learning outcomes.

- That assessment is designed to describe and measure student achievement relative to the intended learning outcomes.

- That a delegate assessed as achieving these outcomes to an acceptable standard will have met the purpose of the training provision.

This is shown diagrammatically below:

```
                              ┌──────────┐
                              │   AIM    │◄──────────────┐
                              └──────────┘               │
                              ┌──────────┐               │
                              │Objectives│               │
                              └──────────┘               │
        ┌────────────┬────────────┬────────────┐         │
 ┌──────────────┐ ┌──────────────┐ ┌──────────────┐ ┌─────────┐
 │Subject Knowl-│ │Subject-related│ │Professional /│ │  Core   │
 │edge & under- │ │cognitive skills│ │practical skills and│ │ skills  │
 │  standing    │ │              │ │  attitudes   │ │         │
 └──────────────┘ └──────────────┘ └──────────────┘ └─────────┘
 ┌─────────────────────────────────────────────────────────┐
 │             Teaching and Learning                        │
 └─────────────────────────────────────────────────────────┘
 ┌─────────────────────────────────────────────────────────┐
 │                   Assessment                             │
 └─────────────────────────────────────────────────────────┘
 ┌─────────────────────────────────────────────────────────┐
 │   Confirmation of achievement of Learning Outcomes       │──┘
 └─────────────────────────────────────────────────────────┘
```

From this, it is clear that what we are assessing are trainee's achievements in meeting the intended learning outcomes of the provision.

Given that we now have some idea of why we are assessing and what we are assessing, the next question is how can we assess? In more traditional educational setting we may have carried out assessment in a number of ways: written examinations, open book exams, multiple choice questions, essays, reports, practical work, presentations and vivas.

However, in an ICM Short Course none of these approaches would be deemed to be appropriate. The trainees and especially the lead trainer must use their judgement and experience to determine if the delegates have achieved the learning objectives. This type of assessment must be ongoing and can be achieved through formal or informal discussion with delegates, and close observation of their work outputs (e.g. prices of writing and presentations). This type of assessment is called formative (as opposed to mark based assessment which is summative).and is an important method of gaining feedback about the extent to which learning outcomes are being met.

Evaluation

Overview

The aim of this session is to provide an overview of the value of evaluation of courses and experience in the design of evaluation forms to provide feedback to enhance the learning experience.

The objectives are to:

- Be aware of the variety of purpose and methods for successful evaluation.

- Be able to decide on the evaluation criteria in light of course aims and objectives.

- Have practised the design of an evaluation form suitable for the observation of the ICM Short Course.

Methods of Evaluating Training

In general, there are four main methods of evaluating training, namely:

1. Quantitative participant evaluation.

2. Qualitative participant evaluation.

3. Self-evaluation.

4. Peer evaluation.

1. Quantitative participant evaluations

Quantitative evaluations which require delegates to fill in questionnaires and tick boxes/circle numbers to evaluate teaching and learning are commonly used. This approach to evaluation has a number of advantages:

- It generates numerical data which can be manipulated to give statistical/graphical presentations.

- They use a common scale so results are standardised.

However, there are a number of disadvantages:

- The results are crucially dependant on the way in which the questions are termed.

- The results do not explain why the numeric returns are high or low.

- Delegates can rapidly become fatigued carrying out such evaluations, thus the data becomes unreliable.

2. Qualitative evaluations by participants

Qualitative evaluations require trainees to respond to written of verbal questions. The two main methods of securing qualitative data are:

- Open ended questionnaires, and

- structured group discussion.

This approach in provides some indication of the reasons as to why delegates view the course as being effective or not.

3. Self-evaluation of training

It is important for trainers themselves to monitor and assess the quality of their teaching. Often after a session, a trainer would reflect on what went well and badly. However, this information is usually lost by the time the next time round to teaching the session is carried out. Thus, it is usually better for the trainer to write down the good and bad aspects of the session in a structured way, to as to provide a prompt for future sessions. A rigorous keeping of a

training diary or log over time, supplies a trainer with considerable guidance on how to enhance sessions in the future.

4. Peer evaluation of training

In peer evaluation one of our training colleagues observes our training and subsequently provides give us helpful comments a so that training performance can be enhanced.

Observation of colleagues whilst training can;

- Identify aspects of behaviour which are hidden from the trainer by the trainers immersion in execution of the training,
- give the benefit of the peer reviewers own experience in training, and
- give an alternative perspective on the effects of training upon participants.

Thus there are immense benefits, which can flow from peer evaluation of training. However, the peer reviewer will be chosen carefully to avoid any personality conflict.

Strategies for evaluation

These are then the four methods of evaluating teaching, and each has a range of advantages and disadvantages reflecting variously the perspectives (trainees, self, fellow-trainer), the type of data (quantitative vs. qualitative), and the nature of evidence provided (public vs. private). The implications of this, of course, are that strategies for evaluation should be mixed so as to cater for a range of perspectives, types of data, and needs. Such a mix might include:

(i)   A brief self-evaluation after every session in terms of:

- What went well?
- What went less well than I hoped?
- What I will do next time to improve the class?

This takes only a few minutes, and is a simple and effective way of monitoring quality.

(ii) The use of single-or few session trainee quantitative questionnaires.

(iii) The use of standard questionnaires to check out the training course as a whole, which is all but universal.

(iv) Occasional peer review with a colleague.

The above embodies a range of perspectives, methods, and outcomes, and provides a comprehensive basis for the evaluation of training.

In groups, write down some questions that you might use in a quantitative and a qualitative questionnaire.

Development of an evaluation questionnaire for the ICM course

Examples of questionnaire forms used during the ICZOMAT project for the purposes of evaluation are shown on the following pages.

Example of a quantitative and qualitative questionnaire used in the ICZOMAT ICM Short Course, (presented in a compacted format).

It would be helpful if you could complete this evaluation form to assess how far this section has met its objectives and to improve similar courses in the future.

Date:

Course: ICM Short Course

Lead Facilitator:

Session Date:

	Extremely poor				Excellent		*Comments:*
Relevance….	1	2	3	4	5	6	
Content……	1	2	3	4	5	6	
Structure…...	1	2	3	4	5	6	
Presentation..	1	2	3	4	5	6	

What were the **best** things about the session?

What were the **worst** things about the session?

To help us to improve the course, we would greatly appreciate if you could indicate specific aspects of certain sessions which were of particular benefit to you, **OR**, ways in which certain aspects could be improved.

Thank you for completing this form.

Example of a peer evaluation form questionnaire used in the ICZOMAT ICM Short Course, (presented in a compacted format).

Session title:

Date:

Peer assessor:

Session leader:

Having recently observed this session please answer the following questions by putting a tick around the most appropriate column.

	Totally satisfied	Reasonably satisfied	Not very satisfied	Unsatisfied
The learning outcomes were made explicit to the trainees				
That the trainers promoted and maintained interest and attention in the trainees throughout the session				
That the session was pitched at the correct level for the trainees				
That content of the session was relevant to the trainees				
That the session took place at the correct pace for the trainees				
That the session structure was appropriate				
That your teaching aids (e.g. OHP's) were appropriate				
The methods adopted to teach this session were the best way to achieve the learning outcomes.				

In light of the answers to be above questions, is there anything which you would suggest that the trainer could do differently if the session was repeated to a similar group of trainees?

Session 6 - Course notes – Learning in Groups

Aims

- To provide an awareness of the issues to be considered when designing and executing training in small groups and case studies.

Objectives

At the end of this session delegates will:

- Be aware of the variables that affect small group training and techniques for successful management.
- To be aware of a guidelines for the design of case studies.

The Purposes of Small Group Teaching

The rationale for using small group training has been defined in terms of:

- Improving trainees understanding.
- Developing their cognitive skills, principally;
  - reasoning,
  - analysis,
  - comparison,
  - critical education, and
  - problem-solving.
- developing their core skills, including;
  - communications skills,
  - presentation skills, and
  - team working skills.
- challenging and modifying attitudes.

Variables Affecting the Achievement of these Purposes

There are a number of variables which can affect the success of small group teaching:

1. Group size.
2. Group composition and dynamics.
3. Physical conditions.
4. Trainer abilities and skills.

1. Group Size

The size of the group can make an immense difference.

The basic difference is that the larger the group:

- The more difficult it is for the trainer to interact with each trainee.
- The more problematic it is to enable trainees to acquire the understanding, cognitive and core skills which alone justify small group teaching.

2. Group Composition and Dynamics

Group composition is usually beyond our control in so far as we are mostly allocated trainees. So in most cases, it is a matter of forming groups in an effective combination. Group selection can be carried out in a number of ways, however, the following issues should be considered in forming groups:

- *Gender* - males and females have different styles and roles in groups.

- *Culture* - Delegates from different cultures may have very different beliefs about their roles in a training situation.

- *Personality* - Delegates vary considerably in their personalities from the strong-willed extrovert who wants to dominate the group, to the shy introvert unwilling to venture their opinion.

- *Experience* - Groups may vary collectively in their previous experience of small group sessions. If they have been lectured at before, that is what they will expect. If they have expertise at small group training, then they may play a variety of strategic games which will need to be managed by the training team. Such strategic games can be:

<div align="center">

"Grand Silence"

"Monologue"

"Hobby Horse"

"I know but I'm not going to tell you"

"How can you expect me to know when experts disagree?"

"Martyrdom"

</div>

3. Physical Conditions

The setting can be an important influence upon achieving objectives. Whilst many aspects of this lie outside our control (e.g. the room), there are others that may not (e.g. seating arrangements). It is simply important to be aware that:
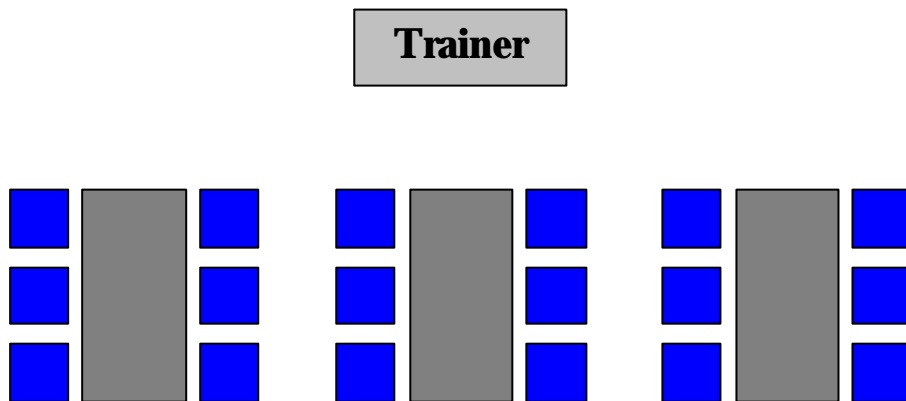
- There is a relationship between the setting and the pattern of interaction,

- the furniture should, if possible, be re-arranged to encourage the desired pattern of interaction.

Look at the configurations below and, on the basis of your experience, consider what pattern(s) of interaction they engender.
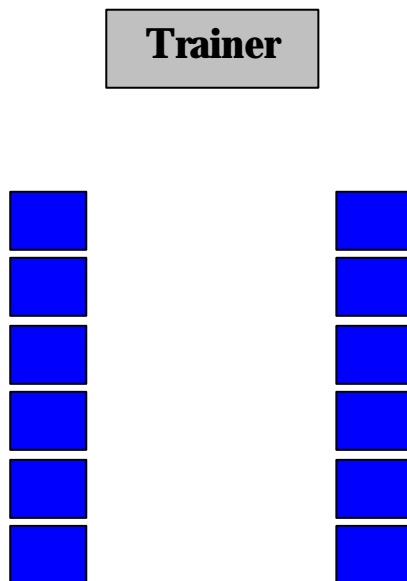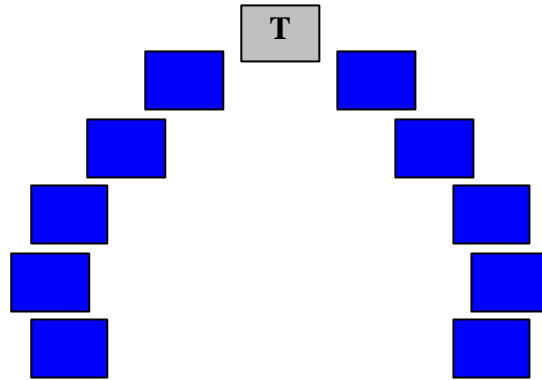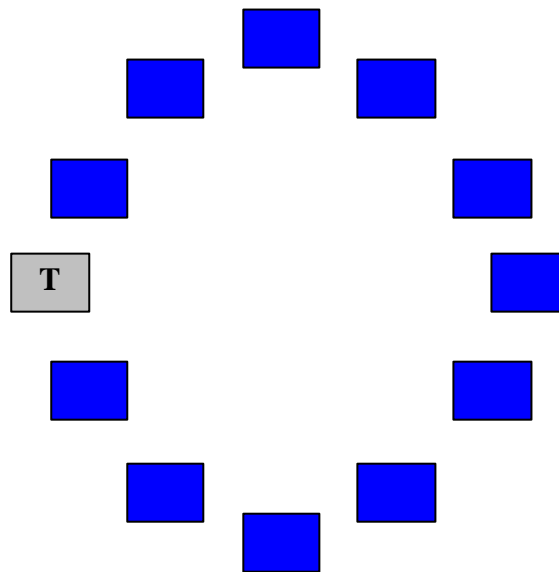
1. Theatre Style

Trainer
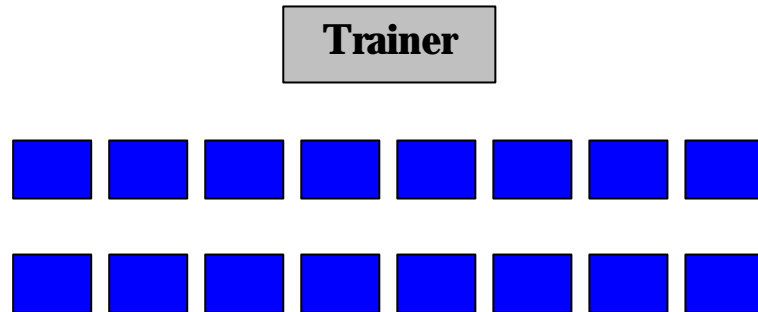
2. Boardroom Style

Trainer

3. Classroom Style

Trainer

4. Horseshoe

5. Circle

4. Trainers Abilities and Skills

The final variable is that of trainer skills. Conventionally, these abilities and skills include:

- Interactive skills, i.e.:
  - Opening small groups,
  - listening,
  - responding,
  - questioning, and
  - closing.
- Structuring and planning small group sessions:
  - How you will develop the session so as to maximise participation and achievement of the learning outcomes. An example might be;

  First trainee presentation on topic   10 mins
  Half-round *"The most important feature was…"*   5 mins

Second trainee presentation on topic	10 mins
Half-round *"The most important difference was…"*	5 mins
Syndicates *"The best case/theory/argument/solution is…"*	10 mins
Reports back	5 mins
Trainer feedback	5 mins

- how you are going to close it:
  - Trainee or trainer-led summary, and
  - indicate follow-up work.
- Trainer link to next topic.

Managing Small Groups

Given that these are the key variables influencing the chances of successful outcomes in small groups, the next question is about how we can manage small groups to achieve them. There are many ways of teaching in 'large' small groups to maximise participation, such as Rounds, Buzz groups, Syndicates, Debates etc. These, then, are some of the ways in which larger groups can be desegregated into smaller ones which will, hopefully, encourage trainee interest and involvement.

In order to cope with group diversity, it is necessary to:

- *Recognise diversity* - look at the composition of the group and consider how this might influence the effectiveness of the group.

- *Develop appropriate participatory strategies* - consider how you can fully involve students who may, for social or cultural reasons, be inhibited from contributing.

Use of Case Studies for Learning

> Consider your teaching, list the case studies that you have used and try to find the reasons why you decided to use a case study rather than another form of teaching such as a lecture.

Reasons for using Case Studies

- Puts information in to context.

- Increases interest, awareness and motivation.

- Allows "emergent learning".

- Allows complex issues to be explored by experience rather than first principles, which may be easier, quicker and more accessible.

- Allows untried ideas to be tested in a realistic environment and learn by failures without doing harm.

Allows delegates from specific sectors to experience issues/problems of other sectors so that interactions are more relevant and therefore productive.

Guidelines for Designing a Case Study

The following four areas need to be considered in the design of case studies:

1. Establish the Aims and Objectives of session and decide how apparent these should be to the participants

A specific learning outcome that was not initially divulged was that "apparently trivial issues can have a major impact on complex, multi-disciplinary projects". This could be termed a "Hidden Agenda".

2. Establish training rationale

The training rationale starts to mould the aims and objectives into a learning package. They form the bridge between the aims and objectives and the **content and structure** of the session. The teaching rationale should be as realistic as possible but also should ensure that the learning outcomes of the session are achieved. It is critical to design the teaching rationale with respect to:

- The time available for training,
- the experience of the trainers and the delegates,
- the information and materials available, and
- the predefined aims and objectives.

Clearly, what this implies is that the same case study materials may be re-used to achieve different aims and objectives by clearly specifying a different teaching rationale.

3. Content and Structure

The teaching rationale defines which materials are required in order to fulfil the aims and objectives. The material must be balanced between core information (required for the trainig rationale) and additional information of no direct relevance to the teaching rationale to give a semblance of reality.

4. Enhancing the Learning Process

A case study approach does not mean that delegates are left entirely to their own devices. Instead it is important that a structure is established to ensure adequate progression towards achieving the learning outcomes. Key issues that must be addressed to enhance the learning process:

Key issue	Possible Considerations
Grouping Structure	Group size and number Group experience Group sectoral specialism Seniority
Results Communication	Time available Delegates' experience
Practical Considerations	Number of facilitators available Availability of suitable space for group work Replicate study packs Audio-visual and computing facilities Logistical considerations (vehicles for field trips etc.)

Conclusion

'Learning by doing method' can best be achieved by small group and case study method. It facilitates deep learning, even within a short span of time such as an ICM Short Course. The variables of group training along with good practices of learning has been discussed here with an aim of providing support for designing such sessions in ICM training.

The other advantages of case studies are that they can simulate the real world. It is clear that ICM does not have a formulaic answer, but involves a lengthy and complex approach in which decisions may be arrived at through consensus value judgements. Consequently, delegates have to get involved with the ICM process and not just learn about ICM from didactic lectures. Case studies can also support the multi-sectoral nature of ICM. Case studies thus represent important vehicles for learning in ICM.

In the next Session an ICM case study has been provided as an example of the approach introduced in this session.

Session 7 - Course notes – ICM Case Study – An Example

Aim

- To critically investigate aspects of the ICM process by an experiential case study.

- To critically reflect on the case study as a method for the delivery of ICM training.

Objectives

At the end of this session delegates will:

- Experienced structured interpretation of ICM documentation, and explored and identified key issues.

- Explored the strengths and weaknesses of the Coastal Management process using a case study approach.

- Gained insight into how to structure and present case study material.

- Reflected on the weaknesses and benefits of case studies as a form of delivery for ICM.

A critical review of the ICM process and Management Plans

Literature has suggested that the key issues of any ICM plan are:

- A cross-sectoral and inter-disciplinary approach to ICM.

- Clearly articulated development policies and a clear and comprehensible management plan.

- A lead organisation or group to co-ordinate the development, establishment and implementation of ICM.

- Power and resources to implement the ICM plan.

- Stakeholder support and involvement.

- An effective mechanism for co-ordination both horizontally and vertically.

- Institutional capacity for effective implementation of ICM.

- Enhance stakeholder awareness of the benefits of ICM.

The following real-life exercise is designed to assess the ICM plan in to the key issues outlined above.

Scenario

You have been employed to review specific key aspects of an already developed ICM plan. The environmental consultancy that you are working for is tasked to produce a 'fact appraisal report' reviewing the overall adequacy of the ICM plan, highlight key areas of concern requiring further development and to outline measures that need to be taken to bring the ICM Plan into line with best practice. **For the exercise you are tasked to produce a one-page fax of bulleted items that you feel are the main issues related to the adequacy of the ICM plan**. These key points will be presented to the wider group in a short presentation.

Scoping points from the ICM plan

Was the information presented in the plan adequate in its detail and breadth to permit a critical review?	Reasons:
Was there enough information on the study area to permit an ICM plan to be documented?	
Was the information used in the ICM plan presented in a clear and concise manner?	
Identify the major components of the study area and specific changes that are taking place/is expected to take place?	

Key Points from the ICM Plan

Identify the key issues which requires attention of coastal managers	Reasons:
Assess whether the risk on different development initiatives/stakeholder groups has been evaluated?	
Assess whether the cost and benefit suggested management options has been defined and discussed?	
Are the proposed the management options implementable?	
Are the development policies clearly articulated and is the management plan addresses the key concerns	
Is there a lead organization or group to coordinate the development, establishment and implementation of ICM	
Is there power and resources available to implement the ICM plan?	
Was there an effective mechanism for coordination both horizontally and vertically?	

Was there institutional capacity for effective implementation of ICM?	
Was there evidence of stakeholder support and involvement?	
Was there an indication of efforts to enhance stakeholder awareness of the benefits of ICM?	

In your role as review consultants, you must communicate your findings to the consultancy that developed the ICM Plan. Prepare a 15 minute presentation covering the key issues identified by the questions above using the one page fax of bulleted points as your only overhead (minimum font size 24).

Compare your groups work with the other group(s).

To what extent were the findings of the groups:

(a) similar?

(b) inconsistent?

Why do you think that these differences / similarities occurred?

Evaluating the Case Study Exercise

After completing this short case study in ICM it is time to reflect about the session. Fill in your thoughts about the session using the following boxes.

Do you think that the objectives (learning outcomes) of the case study could have been achieved by lectures alone?

Reminder of ICM case study session Objectives:

Experienced structured interpretation of ICM documentation, and explored and identified key issues

Explored the strengths and weaknesses of the Coastal Management process using a case study approach

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Were you able to learn from any failures / omissions in the case study which would have been harmful if you had made the same errors on the real world?

Do you feel you were able to experience the issues and problems faced by workers in sector that is different from your own? Could this help you with interactions with colleagues in the future?

Yours answers will be discussed in a group session once you have finished.

Session 8 - Course notes – ICM Training practice

Aim

- To provide delegates with an experience of designing, executing and evaluating a group training session in ICM.

Objectives

At the end of this session delegates will:

- Chosen an appropriate topic related to the ICM Framework.

- Decided on, aims and objective of the session.

- Determined suitable content to for a 90 minute session.

- Designed and carried out a group exercise appropriate for the desired level of learning.

- Experienced carrying out of peer- and self-evaluation.

Training scenario

You will be divided into two groups. Each group will be provided with the case study material used in the previous session.

Each group will be assigned the following tasks:

1. Your team has been assigned to design a training session for professional coastal managers. Using the provided case study material, select a topic within ICM in which to train the other group. You can choose the topic, it could be the use of a tool from within the Framework (Matrix, Stakeholder analysis, Risk Evaluation or Benefit Cost Evaluation), or aspects related to one or more boxes of the Framework, e.g. scale issues, or information gaps. When your group has identified a topic, confirm it with one of the trainers.

2. Concisely write down the background relevance to the ICM Framework, aims and objectives of the session.

3. Design a group exercise lasting for 90 minutes on your selected topic.

4. Review self- and peer-assessment forms presented earlier in the course.

5. Execute the training programme

You will be provided with 3 hours to design the training session. You will be supplied with a set of training equipment (computer, LCD projector, transparency sheets, flip-chart paper, Post-it notes, paper cards and a selection of pens). Further supplies might be available if you ask a trainer.

Evaluation

The session that you give will be evaluated in two ways: self and peer evaluation. You are required to review the evaluation forms from the Evaluation session presented earlier, if you require any changes to be made to the forms then identify them and a trainer will supply the amended forms.

After the end of the session that you present you will be required to fill in the self-evaluation forms. After the end of the session that the other groups presented you will be required to fill in the peer evaluation forms. The results from these evaluations will be discussed within each group and the common points identified. These will be compared to the points identified from the other group, and possibilities for training enhancement will be identified.

Summary of activities

Group A	Group B
Decide topic Prepare training Prepare evaluation forms	
Present training session	Act as trainees
Carryout out self evaluation Group discussion on similarities of self evaluation	Carryout peer evaluation Group discussion on similarities of peer evaluation
Trainer led discussion assessing evaluation process, training session, and possibilities for improvement.	
Act as trainees	Present training session
Carryout peer evaluation Group discussion on similarities of peer evaluation	Carryout out self evaluation Group discussion on similarities of self evaluation
Trainer led discussion assessing evaluation process, training session, and possibilities for improvement.	
Concluding comments on design, execution and evaluation emergent findings	

An approach for Integrated Coastal Management Training

To be successful in its goals ICM requires personnel who couple suitable knowledge of the coastal processes with an intimate knowledge of the process of ICM. If either of these aspects are inadequate, then the complexity of coasts means that ICM plans can be highly sectoral, based-on individual's value-judgements and not implementable. Rather than approaching ICM through the delivery of sectoral knowledge, the short course curriculum aims to access ICM through an understanding of all the processes – natural, social and economic – that shape the coastal zone. Consequently the curriculum is based around facilitating the participants through the process of ICM, supplying supporting information as required.

In order to ensure that knowledge inputs are placed into an ICM context, the course uses a case study to create a "virtual scenario" area approach to demonstrate how and where sectoral views fit into the management process. Participants are guided through work-like scenarios where a multitude of information on a particular area is provided, the participants having to use this to make an ICM plan. In this way the subject of ICM is tackled primarily from the development of solutions. A case study helps foster an appreciation that it is not the degree of knowledge about coastal systems which is important, but an appreciation of the relevance and context of individual knowledge areas with other areas of knowledge. This is required in order to take a holistic view of an area and/or activity requiring coastal management. Where groups of participants work together, a case

Table 5.1. The stages of training designed to improve ability in relation to specific aspects of a trainee's job and/or training requirements.

Area	Coverage	Learning Outcomes
Coastal processes	Sectoral knowledge of coastal processes from biological, physical, social and economic perspectives.	Sectoral knowledge and understanding.
Patterns formed by these process	How processes generate pattern, e.g. habitat mosaics, biodiversity, geomorphological features, coastal communities.	Integration of knowledge towards definition and principles of ICM.
Anthropogenic impacts on processes	Ways in which man impacts upon these patterns & processes e.g. pollution, fisheries.	Problem and conflict identification.
Context of patterns, processes and impacts	Wider secondary aspects that affect the above, e.g. legal context and social context (population activity, economic status).	Determining solution strategies and formulation.
ICM	Integrating process, pattern, impacts and context into principles of ICM.	Determining ICM plans in light of conflicts.

study also helps to embed the considerable academic knowledge that each participant in a training programme for professional development will already have in a practical coastal management framework. Within a training group, this approach can promote awareness of the multi-disciplinary and cross-sectoral nature of ICM thereby developing the participant's appreciation and understanding of coastal management through active engagement with the coastal management process.

Short course structure

The short course design has a curriculum where components are tightly coupled to each other thus building knowledge and understanding over the duration of the course. The curriculum seeks to inculcate an approach that develops awareness that we are dealing with a complex subject which needs to be addresses in an integrated and non-sectoral fashion.

The rationale for the short course design is to lead the participants through a series of stages that sequentially challenges a narrow sectoral focus to management issues to cross-sectoral and holistic approaches to management (Table 5.1). It replaces a focus on the acquisition of knowledge as the pre-requisite for ICM to one of understanding the processes and activities that are impacting the coastal zone. This process is supported by the ICM training framework and supporting tools.

The Aim of the short course is:

To provide participants with a review of coastal management issues and problems, experience with the process of

coastal management and an integrated approach to problem solving.

At the end of the course the objective are that participants will have:

- Gained an appreciation of the wide range of environmental, social and economic dimensions to coastal areas and the associated conflicts and problems,

- experienced the complexity of the process of ICM through a case study,

- engaged with and appreciate the ICM process through a training framework and matrix-based decision making tool to identifying potential management solutions for a coastal area,

- experienced a process of negotiation to arrive at a consensus approach to management issues identified from a case study area, and

- demonstrated their capability and capacity for ICM through writing an outline ICM plan.

To achieve these aims and objectives, the short course is structured such that knowledge is presented within the context of coastal processes and activities, rather than through individual disciplines. Practical examples to illustrate lectures are drawn from the case study area so that participants begin to engage with, and gain some secondary information about, the cases study area. At the same time the tools that support the analysis of information derived from the case study area are introduced. During the fieldwork, participants have an opportunity to make observations and gather primary information from the case study area to flow into the training framework and tools.

Table 5.2. Short Course in ICM Timetable Structure.

DAYS														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

KNOWLEDGE
Lectures/Seminars

TOOLS
Briefing on Tools   *Using Tools*

CASE STUDY
Exposure to 2º data   *Exposure to 1º data*   *Analysis*

REPORTING
Tool Outputs   *Reporting*

The reporting phase allows the participants to demonstrate the understanding they have gained of the case study area and their capability to synthesise the information they have gathered in order to produce a report that outlines an ICM plan. This process is illustrated in Table 5.2) and an indicative timetable that would support such a programme is given in Table 5.3. In order to deliver the short course, these teaching and learning activities are compiled into a programme that splits the course into three modules:

Module 1: Coastal Processes and ICM

This module seeks to put into an ICM context the knowledge required in order to comprehend the natural, physical, social, economic and political processes that take place in the coastal zone. Each session is designed to ensure that knowledge is presented in a manner that promotes understanding of the linkages between processes and how they impact each other, rather than simply attempting to make participants more knowledgeable of academic disciplines. In particular, participants are encour-

aged to consider information in a manner that explores the relationship between the resources provided by the environment and how man's activities impact the environment and availability of resources for exploitation. During this module the framework and the tools are also formally presented so that participants can begin to place the information they receive during training sessions in the context of the ICM process. By the end of the module it is expected that participants will begin to challenge their own preconceptions of the causes and effects of man's interactions with the coastal environment that will encourage them to view the case study area with a holistic perspective rather than from a single sector standpoint.

Module 2: An ICM case study

The case study provides an opportunity for participants to investigate the interactions between the environment and man, and *vice versa*. The approach taken is to allow participants the opportunity to experience real examples of coastal management issues, so that they may build their capacity as much

Table 5.3. Example of Short Course timetable.

	Day1	Day2	Day3	Day4	Day5	Day6
Week One	Module 1: Coastal Processes and ICM					
Morning	Welcome	Coastal Geomorphology	Climate	Coastal Pollution	Spatio-Temporal Information	Guidance for Case Study - Field Briefing
	ICM & Sustainable development	Biological Resource	Coastal Biodiversity	Functioning Coastal Ecosystem	Environmental Economics	
Afternoon	JIGSAW exercise	Social, Economic & Political Dimensions	Coastal Protection	Policy Governance in ICM	Coastal non-living resources	Free Time
	ICM Training Framework	Stakeholder Analysis	Matrix tool	Risk Assessment tool	Benefit-Cost tool	
Week Two	Module 2: An ICM case study					
Morning	Series of field visits on each day to incorporate both group observation of case study area and organised meetings with stakeholders				Identify issues/problems	Free Time
Afternoon					Implementation of ICM tool	
Week Three	Module 3: Preparation of an ICM plan					
Morning	Summary of whole case study	Fieldwork analysis	Fieldwork analysis cont…	Briefing on outputs	Report Writing cont…	Report presentation
Afternoon	Guidance for Report Writing	Fieldwork analysis cont…	Report Writing start	Report Writing cont…	Report Writing cont…	Valedictory

through seeing and doing as hearing. The aim of the case study is to explore what issues might arise in deciding a coastal management strategy for an area. The case study will entail an analysis of the physical, social, economic and political dimensions of the coastal management challenge. Through their analysis, participants identify the range of individuals and organisations who might seek to express views on the nature of a management strategy; and consider ways ac-

counting for the values that these individuals and groups place on the environment.

Module 3: Preparation of an ICM plan

This final module provides an opportunity for participants to engage in the process of analysing their observations from the case study in order to establish management strategies and priorities, and identify possible management solutions and evaluate their likely success and impact on identifies issues and problems. An important aspect of the final module is that participants work together as a single or small number of groups so that they have to negotiate and arrive at a consensus for their management decisions and write an outline ICM plan for the case study area agreed upon within each group.

Indicative Session Notes

The following notes provide guidance for the content area suggested in the timetable given in Table XX, and ideas for exercises that can be used to develop understanding of how individual discipline and sector areas fit into an overall holistic ICM process. The detailed content for these topic areas is left to the individual trainer, in consultation with the core management team, to decide based on their own experiences and expertise. However, within all sessions there is an underlying rationale that conceptual issues relating to individual discipline inputs into coastal management and their integration with other disciplines should be addressed. It is important that the detailed content reflects the reality of the policy environment, the development context, and physical and biological dimensions, as well as the information needs for management in contrast to scientific expertise. To this end, there is a focus on understanding the relationship of each topic area with the human and natural activities and processes taking place in the coastal zone, the drivers of change and the impact of those changes on to those processes and activities. Also provided are guidelines for the use of the tools that support the training framework, the organisation and running of the case study (Module 2), and the layout for the course report outlining an ICM plan for the case study area (Module 3).

Module 1, Session 1: Integrated Coastal Management in the South and South-east Asian Region

Keywords: Integrated coastal zone management; Sustainable development; Coastal environment; Coastal resources; Integrated coastal zone management principles and practices.

Learning Outcomes

At the end of this session participants will:

- Have gained an overview of the coastal environment, coastal resources and their uses by coastal communities.

- Be aware of coastal activities and issues in the South and South-east Asian region and their own country.

- Be familiar with coastal management principles and practices.

- Have gained an appreciation of the concept of sustainable development and its relationship to the ICM process.

- Have experienced an exercise to explore the relationship between the terminologies of different stages in the ICM process.

Relevance to ICM

One of the important objectives of the course is to improve the awareness of participants of the many sectoral interests that impact upon the coastal zone. Another objective concerns the emphasising to the participants the need for reflecting on their current practices in light of the principles and practices of ICM.

The process of Integrated Coastal Management is much used as a mechanism whereby sectoral interests meet, talk and participate collectively in order to resolve conflicts, issues and problems relating to the coastal zone. However, very often the priorities of ICM are those of the managers, which in turn are based on their own personal experiences, training and thus may result a sectoral bias. The short course provides an opportunity to meet and discuss with fellow participants and contributors from many of the different sectoral interests that impact upon the coastal zone.

Rapid population growth and high levels of competition for resources have affected sustainable development of coastal areas. Sectoral approaches have largely failed to achieve sustainable development of coastal resources. ICM potentially represents an alternative approach to traditional methods of planning and management in the coastal zone.

Integrated Coastal Management (ICM) has been described as a Tool for Sustainable Development. It provides a framework and practical tools to meet the challenges of sustainable development in coastal areas.

The goal of ICM is often stated as improvement in the quality of life of human communities who depend on coastal resources while maintaining the biological diversity and productivity of coastal ecosystems (GESAMP 1996). This goal is

synonymous with the sustainable development agenda that emphasises, protection of the environment and biodiversity, with consideration of economic benefits and social welfare. Therefore, the challenge in contemporary coastal management is intertwined with the debate on sustainable development. Though a difficult concept to define - and to agree upon the implications of a definition - there are four key components that can be considered relevant to discussion of renewable natural resource management:

- Maintain critical thresholds of ecological capital.

- Maximise economic welfare.

- Maintain resilience of ecological, social and economic systems.

- Ensure non-declining levels of welfare or utility over successive generations.

These four key components of sustainable development integrate bio-geophysical, ecological and economic considerations. These components can be linked together to provide a generic framework for thinking about sustainable development.

The challenge on both a national and micro level is to balance the desire of communities for increased economic welfare for current and future generations with the need to maintain levels of ecological, economic and social capital that ensures resilience in the long term. Given this, the requirement for management of coastal resources is to trade-off development goals relating to production, conservation and distribution of benefits.

Indicative Content

This session will provide participants with an overview of ICM as a management approach, its concepts and processes and the context for its perceived need to address issues and problems in the coastal zone of the South and South-east Asian region.

The suggested section areas outlined below focus on a sequential awareness in participants of the coastal environment; the dependency of many of the peoples in the region on coastal resources; the conflicts and issues that result; the need for holistic and integrated management and ICM as a tool to achieve this.

In global terms the importance of the coastal zone is illustrated by the following:

- Approximately 60% of the world's population live in coastal areas.

- 75% of the world's population will be living within 60 km of the sea by 2020.

- Many of the earth's most productive ecosystems are found in the coastal zone.

- 95% of all marine capture fisheries are derived from coastal waters.

- The coastal zone is a focus of expansion and diversification of economic activity.

Regional/Country coastal characteristics:
Explanation of why knowledge on the coastal environment and coastal resources, the activity and issues that arise from their uses and the existing legal instruments at Regional, National and Country level is a prerequisite for participants to enter a framework for elucidating the ICM process.

The land/ocean interface produces diverse and productive biological systems that exist within a highly dynamic physical environment. As populations increase and increase their level of socio-economic development the competition increases for space and resources on coastal areas. Discussion with the participants can be organised around the following theme areas:

- Summary of the wide variety of diverse habitats and ecosystems (e.g. estuaries, coral reefs, sea grass beds, mangroves, creeks, lagoons, bays, beaches, sand dunes, mudflats).

- Highlight key functions (refers to habitat, biological or system properties or processes) that generate benefits in the form goods (e.g. food, oil, minerals and other products) and services (e.g. natural defences against storms) that ecosystems provide.

- Briefly describe the results of competition for space and resources on the coast and offshore are often considered to be common property where there is often more than one user community who exploit the goods and services provided by the coastal environment. This may include discussion examples of conflict and destruction of the integrity of the resource system.

- Summarise how these processes exacerbate the impact of hazards – e.g. flooding; erosion; disease; sea level rise.

- Discuss the need for problem resolution and management given the importance of coastal areas to national economies (e.g. 24% land area contributes 40% of GDP by 50% of population in Sri Lanka) and the high coastal population densities especially in relation to urban development and megacities.

- Highlight the need for addressing poor institutional capacity and political support (i.e. through discussing the impacts of poor planning and management) and the role of key legislation in relation the current coastal management priorities.

- Highlight the problems and issues that arise from the need to define the coastal zone.

Exercise

Break into three groups.

With reference to the issues discussed with regard to definitions of ICM and the coastal zone, the landward and seaward boundaries and pragmatic considerations, each group should consider:

1. What are the main coastal issues in the country/region and what legislation exists to address this?

2. What are appropriate boundaries for these issues? (How feasible is it to use different boundaries for different issues?)

3. What existing jurisdictional units might be appropriate for ICM within the boundaries identified above?

Each group should prepare a short presentation on these points (and any other important points which arise). Recommendations to resolve problems identified should be a key element of the presentations.

ICM and sustainable development

Information to discuss this theme in relation to ICM and sustainable development could be organised under the following theme areas:

- Discuss why knowledge in itself will not confer capability to engage in the process of ICM unless participants are aware of the underlying principles and practices of ICM and how they have been applied both regionally and country-specifically to manage coastal activities and the associated ICM issues and problems.

- Highlight how the principles of sustainable development are encompassed within the framework of ICM.

- Review the definitions for ICZM and the types of associated goals. Examples should be drawn from the literature in order to describe the intended benefits of ICM (improved quality of life, equity in distribution of resources, resolution of conflicts, conserved ecosystems, management of habitat and resources) in relation to coastal management issues.

- Emphasise that the challenge is for scientists from all disciplines is to change from an ethos of gaining knowledge about individual discipline characteristics of coastal systems to understanding of the multiple dynamics of the coast, and conveying this understanding to other disciplines and, more importantly, decision makers.

- Explain, therefore, that ICM must be an implicitly holistic process that integrates understanding of the social, economic and environmental processes of the coastal zone and includes sustainable development concepts.

- Discuss the need to construct solutions multiple dynamics of the coast, and

conveying this understanding to other disciplines and, more importantly, decision makers.

- Discuss the need to construct solutions that are focussed on managing the range of activities taking place, rather than solutions that only tackle specific aspects of problems be they social, economic or environmental.

Uses, Problems & issues in the coastal zone.

- Uses include, agriculture; aquaculture; forest industries; heavy industry; infrastructure; mining; national security; petroleum industry; ports & marinas; tourism; settlement; waste disposal.

- Issues include, degradation of natural resources; sources of pollution; land-use conflicts.

- Barriers to implementation include population pressures, poverty, unsustainable development, lack of awareness/ understanding, lack of governance.

- Management strategies include sustainable exploitation of natural resources; protection against natural hazards; pollution control; economic planning; social welfare.

The short course in the context of sustainable development and ICM

While the short course starts with the issue identification and assessment stage of ICM, using the ICM/Project cycle, for instance as illustrated in GESAMP (1996), the participants should be able to apply their knowledge and experience to all stages of the project cycle. It is essentially a process of compiling, integrating and prioritising information that defines the environmental, social and institutional context within

which the ICM programme will proceed in terms of the following considerations:

- Integration, co-ordination and barriers:

- Integrate environmental, economic, and social information from the very beginning of the ICM process,

- include an assessment of benefits and costs and a risk assessment in the evaluation of development alternatives,

- establish mechanisms for integration and co-ordination, and

- barriers to implementation of ICZM in the context of social, economic, political and environmental drivers.

- Sustainable development:

- The coastal zone is unique and has special needs for management and planning that encompasses both land and water uses,

- a major focus of ICM in developing nations is on common property resources,

- multiple use of renewable coastal resources is emphasised by coastal management and planning, and

The ICM Jigsaw Exercise in ICM terminology.

This exercise demonstrates to trainees that different people interpret information (in this case in the form of words or short phrases relating to coastal management) according to their own experiences. At least 2 hours should be set aside for the completion of the suggested exercise. Fill details for this exercise are on page xx. Once completed, trainees are asked to find where all groups have placed words in the same heading and then a discussion is initiated to debate why and why not words have been placed under the same/different headings.

- the structure of the short course reflects these concerns and the participants are encouraged and facilitated to explore the issues.

Points for the Conclusion

Emphasis should be given on:

- The multiple uses and users of the costal zone.

- ICM as a tool for sustainable development rather than an independent system of governance.

- The need for multi-disciplinary and cross-sectoral approaches to the design and implementation of management options.

Teaching tips

Engage with participants by enquiring on their understanding and experience of ICM

Explore their views on the need for ICM

Identification and prioritising coastal issues

Differences and similarities in ICM issues and management practices

Relationship of ICM to sustainability goals

Building-up summary tables for coastal characteristics (environmental and social & economic)

References

Kay, R. & Alder J. 1999. Coastal planning and Management. 375pp. Spon Press, London. ISBN 0-419-24350-X.

Vallega, A. 1999. Fundamentals of Integrated Coastal Management. 264pp. Kluwer Academic Publishers, Dordrecht. ISBN 0-7923-5875-9.

On-line websites dealing with ICM

GESAMP (IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP

Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection). 1996. The contributions of science to coastal zone management. Rep.Stud.GESAMP. ISBN 92-5-103856-2. http://ioc.unesco.org/icam/GESAMP%20Report%20No%2061.pdf, and http://www.fao.org/docrep/meeting/003/w1639e/w1639e00.htm.

http://www.iczm-sa.org. Describes the ADB-RETA project titled Coastal and Marine Resources Management and Poverty Reduction to promote regional cooperation among participating countries in strengthening management of environmentally sensitive coastal and marine resources using ICM approaches.

http://www.ea.gov.au/coasts/publications/index.html and http://www.environment.sa.gov.au/coasts/index.html. Good sources of material on coastal planning and the Australian approach to ICM.

http://www.coastal.crc.org.au/index.html. Highlight *Publications and data* and follow link to **Social science toolkit**.

http://www.nre.vic.gov.au/coasts/coastkit/. The aim of the Coast Kit is to explain some basic principles of ecology and coastal processes and to show how these are connected to uses and management of the coast.

http://www.fao.org/docrep/W8440e/W8440e00.htm. FAO Guidelines for Integrated coastal area management and agriculture, forestry and fisheries.

http://icm.noaa.gov/welcome.html. Includes links to regional information and other ICM publications available on the Web as well as information on the USA approach to ICM.

http://europa.eu.int/comm/environment/iczm/. Outlines the background to the European strategy for coastal management.

http://www.netcoast.nl/. Useful site with information, links to other ICM websites, and ICM documents available on-line.

http://coastalmanagement.com/. A not-for-profit venture to help coastal managers find resources to help do their job more effectively, and to keep them up to date on the latest trends worldwide.

http://ioc.unesco.org/icam/. Describes the IOC Coastal Area Management activities and publications.

http://www.crc.uri.edu/. Rhode Island Coastal Resources Centre website includes links to the InterCoast newsletter.

Module 1, Session 2: Coastal Geomorphology

Keywords: Coastal landforms; Coastal processes; Sediment Supply; Erosion; Accretion; Coastal configuration.

Learning Outcomes

At the end of this session participants will:

- Have gained awareness of the different types of coasts, their diverse physical forms and processes.

- Have understood the basic patterns of the dynamics of sediment movement.

- Be familiar with the identification of the geomorphic features from the maps and satellite images.

Relevance to ICM

For effective coastal zone management, it is essential that the physical boundaries of the management unit be defined clearly. The physical boundaries of the coast largely depend on the geomorphology. The geomorphology of the costal regions is largely influenced by the interaction of land, air and marine processes. Knowledge on the coastal geomorphology of the system, in a defined spatial and temporal scale is important to formulate an effective management plan.

The shallow marine and river flow dynamics along with the interactions driven by the energy of waves, tides and currents are the major controlling factors of coastal processes. There are upstream activities like dams/diversions, which also determine the shape of the coast and its uses. A change in these processes can alter the system and produce undesired consequences, which need further attention and management efforts.

The geomorphology of a coast is the primary observable feature from which first hand ideas regarding the processes and problems of a coast can be generated if properly interpreted.

Indicative Content

This session focuses on the form-process variability and its impact on the environment. The session also addresses the responsive coastal landforms and resultant factor of interactive processes with time and space. The content needs to revolve around the drivers, and their sources/causes for change in the context of ICM. While the morphologies like beaches or lagoons maybe explained with maps and photos, changes like erosion and accretion may be demonstrated using time series analysis, for example from satellite data. It is important to establish the linkages of such changes with natural and man made causes like construction of upstream dams to modify the driver like sediment supply to the coast. Interaction between physical and biological environment with human activities need to be emphasized.

The session should include:

- Describing different types of coasts, the processes and the possible landforms.

- Offering an understanding on the process variability and resultant landforms through time and space.

- The cause and effect scenario of landforms and its linkage with other environmental domains.

On the basis of the above ideas the following aspects may be covered:

- The smallest coherent area of a shoreline is the coastal cell. These are defined as sections of the coast within which movements of sediment (sand, gravels) are contained; which have discrete character in terms of geomorphology, geology or biology; and which therefore operate independently of adjacent cell units.

- Relationship of the shape of a coast to energy inputs (e.g. waves) and resistance (e.g. rock, sand, mud) and if energy exceeds resistance then shoreline erodes, and if resistance exceeds energy then shoreline accretes.

- Description of different Types of Landforms – Estuaries, Mudflats, Saltmarsh, Delta, Beaches, Coastal dunes, Cliff and their uses.

- Spatial and temporal variation in coastal process.

- Drivers of coastal processes: Energy, such as Wave, Tide, Current, Littoral drift.

- Sediment supply: Sediment processes and resultant changes in landform.

- Linkages – climate, pollution, protection, biological, human.

Points for the Conclusion

Emphasis should be given on the:

- Understanding of spatial and temporal variations in the form-process interactions in a natural system.

- Understanding processes leading to landform changes.

- Understanding of possible impacts on other biological and human environmental parameters and management needs.

Teaching tips

- As the participants are from different background there need not be any elaborate explanation of the intricacies of geomorphology.

- Only some of the important landforms and processes need to be covered.

- Explanation of various terms associated with it may be explained in a very simple and brief manner, possibly with their interaction with the other components of coast.

- As far as possible explain the various aspects with the help of maps, satellite images, photographs etc. preferably from the case study area.

References

Pethick, J. 1984. An Introduction to Coastal Geomorphology. 272pp. Edward Arnold, London. ISBN 0-71316391-7.

http://www.geog.ouc.bc.ca/physgeog/contents/11m.html. Lecture notes by created by Michael J. Pidwirny, Ph.D., Department of Geography, Okanagan University College.

Module 1, Session 3: Renewable Resources.

Keywords: Renewable resources; Sustainable use; Maximum Sustainable Yield (MSY); Overexploitation; Degradation; Precautionary principle.

Learning Outcomes

At the end of this session participants will:

- Have gained insight into the range of biological resources of the coast.

- Become familiar with concepts of a renewable resource and sustainable use and the consequences of this to ICM.

- Have gained understanding of the importance of fisheries in the coastal zone.

Relevance to ICM

In examining biological resources, it is useful to cover two main agendas in this session. Firstly, in the preparation of an ICM plan it is necessary to have an overview about the nature and variability of the biological resources associated with the coast. Secondly, we are particularly interested in understanding how the livelihoods of households living in coastal communities rely on renewable biological resources. An important dimension of this is how the alignment of incentives determined by economic, social and political processes influence patterns of resource use. In addition, there are often also wider and less tangible benefits.

The stocks of the key biological resources in the coast have the potential to regenerate and are thus termed renewable resources. In relation to this, the concepts of carrying capacity and sustainable use are important to elucidate to the participants. It is vital that participants develop awareness that sustainable use can, in many cases, incrementally produce greater benefits from the resource over the type of long term planning horizon seen in ICM. The challenge is often to manage short-term overexploitation that results in the collapse of the resource stock.

Indicative Content

This session will consider some of the key characteristics of some of the most important biological resources in the coast. The particular selection of these can be dependent on the local situation and the needs of the participants.

The range of biological resources

The following general points can guide the content.

The coastal area is a highly productive area in terms of biological resources. This is why population pressure, and consequent exploitation of biological resources is high on many coasts. Competition for biological resources is one of the main reasons why there is conflict in the coastal area.

There is a wide range of biological resources of coastal areas, two examples are:

- Fisheries, and

- wood from dune plantations and mangroves.

Many coastal communities are highly reliant on coastal biological resources for food and shelter. The conversion of land can provide new economic opportunities that impact

upon the availability and quality of other resources, for example the alteration mangrove areas for aquaculture.

In addition to the more obvious economic value of renewable resources, there is a wider context to consider. Biological resources can also provide aesthetic and amenity value (a basic resource requirement for the tourist industry). In some areas having protection from hazards is an import benefit from a biological resource. The role of mangroves in decreasing the impact of cyclones is a good example of this.

Biodiversity considerations are becoming increasing important in the debate on resource use. This area is covered in the session on Biodiversity, however, it is worth commenting here that the gene pool associated with biodiversity is a significant resource, both at the present and in the future.

Managing Biological Resources

Each biological resource has specific details regarding its management. However, there are some overarching concepts. The most important is the sustainable use. Sustainable use allows the biological resource to be utilised in a renewable way such that the communities that use the resource can rely on future streams of benefits. This means that year on year, a limited amount of the resource can be used. However, if the resource is overexploited then there is a loss in the productivity of that resource base. Clearly, a coastal manager would like to know how much of the resource can be taken in a sustainable way: this amount can termed the maximum sustainable yield (MSY). However, calculation of the MSY can require considerable data and be com-

plex. Attempts at determining MSY can be hampered by poor quality or incomplete data. This can lead to bad judgements being made if the validity of the data is not questioned. Caution is often advisable in setting harvest levels. Thus the concept of the precautionary principle can aid in guiding these types of decisions. In addition, MSY can change over time due to exogenous factors. The concept of MSY is common to renewable resources; however, it has been commonly used in fisheries modelling and forestry.

Overexploitation of biological resources is not the only cause of a declining resource base in a coastal area. Sustainability of a biological resource can also be impacted through loss of functioning within the ecosystem. For example, inshore fisheries might decline through pollution that causes mass mortality of fish larvae in nursery grounds in estuaries.

As fisheries and aquaculture are such a major component of coastal activities and livelihoods it is appropriate to consider their particular impact on the coastal zone. The issues associated with these two areas encapsulate many of the challenges associated with resource management.

Fisheries

Areas that could be covered in a discussion of fisheries include:

- What is a fishery including issues of scale and interactions with ecosystems and socio-cultural aspects.

- The impacts of fisheries in terms of:

- Sustainability,

- Effects on the environment, and

- Effects of the environment, e.g. fluctuating stocks.

- Importance to food production locally, regionally and internationally.

- Management issues:

- Yields and gears,

- Conflicts between users - causes, and

- Regulation and enforcement – traditional use rights and legislation.

- Tools for assessment;

- Empirical information – data & databases, reliability and legitimacy,

- case studies of successful and unsuccessful fisheries management, and

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Exercise

The participants, to explore the concept of overexploitation and degradation, can carry out simple MSY calculations. This can work well if groups of participants are given a resource to manage.

If the trainer supplies simple numbers of, for example the MSY, the standing stock, the effect of overexploitation and the effect of degradation on standing stock, then the participants can calculate various scenarios.

For example:

- The total accrued exploitable resource over a 20 year time period.

- The effect of resource degradation over a 20 year time period.

- The effect of different levels of overexploitation/degradation over 20 years.

- The effect of both exploitation and degradation over 20 years.

- The effect of 5 years of overexploitation over 5. 20 and 50 years, compared with no degradation.

- models.

Aquaculture

Areas that could be covered include:

- Importance to food production locally, regionally and internationally.

- Impacts on land-use and the coastal environment.

- Diseases – causes and impacts.

- Farm management.

- Influence on coastal planning.

- Regulation.

Points for the Conclusion

There are two major points that should be reinforced in the conclusion:

- There is a wide range of biological resources in the coastal area.

- It is desirable to manage the resources in a sustainable way to accrue maximum long-term benefit; however there might be many forces operating which can make this difficult.

References

www.cnie.org/nle/crsreports/briefingbooks/oceans/index.cfm. Oceans & Coastal Resources: A Briefing Book.

http://www.crc.uri.edu/comm/publications.html. Include some relevant on-line publications.

http://www.unu.edu/unupress/unupbooks/80130e/80130E00.htm. Proceedings of the Jakarta workshop on coastal resources management.

http://www.atc.stir.ac.uk/Fishing/Fish/F web.htm. World Wide Web sources (including gopher servers and FTP sites) for aquaculture, fisheries, aquaria and fish diseases.

Module 1, Session 4: Social, Economic and Political Processes

Keywords: Community; Market; State; Livelihoods; Stakeholders; Poverty Reduction; Inequality; Legislation; Participation; Macro-Micro Linkages.

Learning Outcomes

At the end of this session participants will:

- Have gained an understanding of the interrelationships between social, economic and political processes that produce different types of outcomes associated with development in the coastal zone.

- Have considered the results of these processes in relation to the livelihood strategies of coastal communities and the resource base.

- Have understood the significance of the gaps where the linkages between social, economic and political processes are either not operating or are weak and the impact of these in systems of livelihood provision.

- Be familiar with the types of action taken by the state and civil society to address coastal issues.

Relevance to ICM

The coast provides an important resource base for the resident population. This key session of the training course aims to provide an insight into the social, economic and political processes that generate networks of relationships that complicate the functioning and therefore management of the coastal system. There are a multitude of stakeholders who depend, for their livelihood and survival, on the coastal resource system. There are various dimensions of inequality that affect entitlements to these resources and through which some groups benefit and avoid the associated costs by passing them on to others. The natural environment produces commodities which are used by the communities for consumption and/or production of surplus, which is exchanged for kind or for money in the market. The drivers of economic changes such as utilisation of natural resources such as oil, gas, fish, minerals, development of indus-

trial sites and the associated changes in technology result in continual changes to the coastal socio-economic system. The dynamism of this system is complicated by migration to coastal cities and the vulnerability for coastal sites to natural hazards. Risk is further enhanced in developing countries by the fact that the population also suffers from high levels of poverty and inequality. Interventions associated with increase industrialisation and commercialisation can undermine environmental functioning thus increasing the vulnerability of the poor.

The generation of conflicts in coastal areas is driven by competition for resources – e.g. land for factories, fish, water for domestic or commercial use etc. – and thus is congruent with the processes associated with economic development. The mitigation of conflicts may be an important part of the process of intervention seen in integrated coastal management plans. The State often

attempts to resolve conflict through regulatory mechanisms that take the form of legislation and policy that seeks to provide incentives or sanctions to influence behaviour. In addition, there are mechanisms in the form of community institutions that also seek to manage resource allocation problems.

Implementation of the policies and associated development plans requires efficient and accountable administrative mechanisms and thus effective governance. In ICM, the inclusion of stakeholder views that are often overlooked can be facilitated through approaches that enable greater participation.

An understanding of the complexity of human components and their interplay with the environment is vital to analysing how the coastal system operates and is sustained.

Indicative Content

This session will focus on how social, economic and political processes determine the access to resources of individuals and households in coastal areas. It highlights the key issues for coastal management associated with the social, economic and political drivers of change that are behind commonly observed conflicts and management challenges. The following themes form useful criteria to organise the session[3]

People at the centre of analysis

Emphasis that people, rather than a focus on natural resources and processes, infrastructure facilities or services, are the priority concern in integrated coastal management. Interventions may take the

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3 The suggested themes for inclusion in this session draw on the literature on livelihoods frameworks. See the references for further material.

form of resource management or support for strengthening governance, but the underlying emphasis is on ensuring that the reality of the challenges facing communities is incorporated into the ICM process. This is of particular concern in relation to the poor. Those experiencing the greatest poverty are usually the most dependent on natural resources.

Dynamics, boundaries and scale

Introduce the idea that just as the physical and biological aspects of the coastal zone are powerful and dynamic so are the social and economic arrangements of the communities in coastal areas. The investments that individuals, organisations and communities make in the coastal zone represent an important factor in shaping a coastal zone plan and in its implementability. Just as there is a problem in establishing the boundaries of the bio-physical systems which affect the coastal zone, there are also problems in deciding the scale of social and economic con-

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Teaching tips

- Explain social science issues in simple non-technical language so that participants from other disciplines can understand.

- Avoid getting bogged down in detail, focus on the key messages that participants should take away from this session and use the lecture material to reinforce them.

- Examples should be given so that the issues are linked to the case study site.

- Focus discussion on the drivers of social, political and economic change that affect coastal communities and resources use. Highlight linkages, consequences and outcomes important for ICM to address.

siderations affecting the ways in which human organisation in the zone will react to a plan.

Vulnerability considerations

The population residing in coastal areas is affected by an external environment over which it has no or little control in the short and medium term. Therefore, to understand the dynamics of the human environment it is useful to reflect on how development trends, the likelihood and type of shocks seen in coastal areas and seasonality affect livelihoods.

Discuss important *trends* that are observed to have impact upon coast communities. These may include population changes including migration, patterns of resource use and associated conflict, national and international economic trends that influence development in coastal areas, developments in governance including politics as well as key changes in technology.

Highlight examples of *shocks* that coastal populations may face and discuss how these present challenges for the coastal manager. These may be natural like cyclones and flooding; disease epidemics; conflict over resources; economic collapse; as well as livestock or crop health shocks – like shrimp disease.

Discuss why it is important to understand *seasonality*. The seasonal shifts in resource availability, prices, employment opportunities, risk of natural disasters and food availability could be examples that a coastal manager may consider when thinking about vulnerability issues.

Assets or Resources:

Emphasise that the ability of households

and thus communities and institutions to cope with changes related to development trends, shocks and seasonality is based upon their ability to mobilise assets or resources. For the coastal manager involved in policy formulation and programme implementation and appreciation of the differences in the asset mix of different stakeholder groups and the associated ability to access resources and the influence the policy process is vital for appropriate intervention.

Structures, Processes & Power

Discuss the diversity of institutions, organisations, policies and legislation that shape the structures and processes that shape social, economic and political processes in the coast. We are concerned with understanding not only what a particular structure is supposed to do but on how they interrelate with other structures. This will include coverage of the key political/legislative bodies at national through to local levels; the ministries and departments with interests in the coast; the role of the judiciary in resolving coastal disputes and enforcement; and State agencies. In addition to the public sector there is the role of private sector - commercial enterprises, civil society organisations that include a range of membership organisations and other NGOs – to consider in the examination of changes on the coast.

Focus specific examples and discuss how these determine access to resources or assets and returns from their deployment.

Emphasise the need for making macro-micro linkages, often the analysis that is incorporated into policies and plans focuses predominantly on one level. Bridging this gap in ICM such that policy is informed by local level concerns should be highlighted.

Include an emphasis on power relations especially in with reference to how formal and informal institutions operate to set the 'rules of the game'. Note that institutions are embedded in and develop form the culture of communities, organisations and society at large and thus are imbued with the hierarchies of power that give status and as well as constraining behaviour through sanctions or providing opportunities and associated

incentives.

Points for the Conclusion

Underline that ICM is not only seeking solution options to coastal issues that are ecologically sustainable but also those which are socially, economically, and institutionally sustainable. In order to do this people need to be placed at the centre of the analysis that underpins ICM.

The specific objectives of an ICM programme may well include outcomes that seek to increase incomes and well-being in coastal communities while decreasing vulnerability in the context of a more sustainable use of the natural resource base.

References

Livelihoods Connect

http://www.livelihoods.org/info/info_guidancesheets.html

Wellbeing in Developing Countries

http://www.welldev.org.uk/

Teaching tips

The following areas may be useful when thinking about both governance and the individual structures and processes that affect livelihoods in coastal areas.

- Roles: Who (which organisations) actually does what? Focus on the reality as opposed to theory of what is supposed to happen.

- Responsibilities: What responsibilities do the different organisations involved in coastal management have? Is there adequate responsibility at lower levels and outside formal structures? How are responsibilities established and enforced? Are they reflected in policy/legislation?

- Rights: How aware are different groups/organisations of their basic rights? How are these enforced or safeguarded?

- Relations: What is the current state of relations between different groups? How do coastal policies (and the bodies that make them) relate to legislative framework and the implementation bodies?

Try to discuss issues beyond just a résumé of the current state of the structures and processes to include the effect that these have on the livelihoods of different groups.

Module 1, Session 5: Climate and Natural Hazards

Keywords: Coastal Climate; Sea Level; Cyclone; Storm Surge; Tsunami; Coastal Disasters.

Learning Outcomes

At the end of this session participants will:

- Have gained a basic knowledge on climate and processes of climate change.

- Aware of the impacts of natural hazards and its impacts on the coast.

Relevance to ICM

Variations in climatic processes involve large-scale air-sea interactions, which often influences various activities in coastal zone. Climatic parameters need to be monitored regularly to be aware of impending storms, extreme wind, and precipitation driven impacts in the coastal zone. For this reason coastal zone managers need to be aware of various risks and their probable impacts due to changing climate such as cyclones and severe storms. The risks associated with extreme events, to which coastal communities can be vulnerable, need to be considered.

Hazards are events or processes that can potentially harm people, property and the environment. Earthquake, volcano eruptions and cliff landslides are examples of natural hazards. Earthquake and volcanism are responsible for generation of very long gravity waves, tsunamis. Impact of high wave thrust exerted by tsunami might have to be considered in ICM.

Indicative Content

The coastal and oceanic climate is responsible for many hazards responsible for the loss of life and property and, in some cases, environmental degradation. The basic linkage between the sources/causes (e.g. global warming), drivers (e.g. low pressure systems) and consequent changes (e.g. loss of

> **Teaching tips**
>
> - Participants from different backgrounds need to be clear about the basic concepts and features of coastal climate and hazards.
>
> - The effect of climate change and possible impacts of this on the coast may be emphasized.
>
> - Emphasis is needed to link the aspects of climate on the other components of ICM. For example the occurrence of a cyclone affects a wide range of coastal components.
>
> - Some information on the methods of mitigation and their effects can be highlighted.

agricultural production due to cyclones) should be understood.

Sources/causes of climate and ocean related processes are severe storms, cyclones, low-pressure systems, and storm surges. Variability in climatic processes is responsible for the genesis of those extreme conditions:

- Describing important coastal climatic parameters,

- offering an understanding on the coastal hazards and resultant impact, and

- the cause and effect scenario of coastal disasters and its linkage with other environmental domains.

On the basis of the above ideas the following aspects may be covered:

- Coastal climates and hazards.

- Coastal hazards and impact on coastal environment and communities.

- Linkages among climate, pollution, protection, biological and human domains.

Exercise

- The participants can be grouped on the basis of diverse locations and specialization, and asked to discuss the various coastal hazards in their area

- The groups can be given published reports of the study area and requested to identify the problems and issues associated with the coastal hazards.

- The groups can be asked to study the maps, imageries, topographic maps etc. to assess the extent of coastal hazards keeping in mind the nature of coast.

Points for the Conclusion

Emphasis should be given on the:

- Understanding of basics of coastal climate.

- Importance of frequency and intensity of coastal hazards.

- Understanding of possible impacts on the biological and human environmental and management needs.

References

http://www.undmtp.org/english/vulnerability_riskassessment/vulnerability.pdf. Disaster management guide.

http://www.netcoast.nl/projects/netcoast/info/history/downloadwcc.htm. On-line publications from the World Coast conference on climate change in 1993.

http://www.ipcc.ch/pub/reports.htm. Reports from the Intergovernmental Panel on Climate Change.

http://www.state.me.us/doc/nrimc/pubedinf/factsht/marine/hazard.htm. Overview on coastal hazards.

http://www.csc.noaa.gov/themes/coasthaz/problems.html. Useful information and links for coastal hazards from NOAA.

http://coastal.er.usgs.gov/hurricanes/mappingchange/. Useful information on mapping coastal hazards.

http://www.proventionconsortium.org/index.htm. Information to help developing countries build sustainable and successful economies and to reduce the human suffering that too often results from natural and technological catastrophes. Includes a link to the "Manual for estimating the socio-economic effects of natural disasters" and other disaster and risk management resources.

http://www.worldbank.org/dmf/index.htm World Bank disaster management facility includes links to resources.

Module 1, Session 6: Coastal Biodiversity

Keywords: Biodiversity; Endangered species; Conservation; Protection.

Learning Outcomes

At the end of this session participants will:

- Be aware of the main characteristics of biodiversity in the coastal zone and their use to man.

- Be aware of the main causes for biodiversity loss.

- Be familiar with the main approaches for conservation of biodiversity.

Relevance to ICM

Biodiversity has had a high global profile over the few decades Considerable efforts are being put into the conservation of biodiversity at the local, national and international scale.

Biodiversity, as the name suggests is simply biological diversity! However, there are a variety of uses of the term. Conservationists tend to use the term in a narrow sense to mean the diversity inherent in natural or semi-natural communities. However, other groups use a wider definition of biodiversity. This wider definition can include man made cultivars, or be used as a general term for biological functioning and productivity.

Biodiversity, in its widest sense, is an important issue for the management of the coastal areas. Many coastal dwellers are directly reliant upon biodiversity for their livelihoods, e.g. fish, firewood etc. However, coastal biodiversity is also of indirect importance to a wide network of individuals, such as fish marketers and ice carriers in a fishing area. Where the biological resource is rich, extensive social networks can be built around such biological resources, such as the "Padu" system in South India. More recently, the global importance of biodiversity

for products, particularly medicines, has been a priority.

Many communities rely on naturally occurring biodiversity, the more developed a society becomes, the more potential they have to impact upon natural biodiversity. In some cases, natural biodiversity can be destroyed and alternative communities set up; one common case of this is prawn aquaculture.

It is clear that coastal biodiversity, in its widest sense, is important to both coastal and remote communities. Consequently, biodiversity is a feature that must be considered within an ICM plan.

The linkages from biodiversity to other aspects of an ICM plan are strong. For example, coastal geomorphology determines the large-scale mosaic of biodiversity types, whereas the administrative governance and social networks can be closely orientated around nodes of biodiversity.

Indicative Content

The indicative content for a knowledge session on biodiversity covers three main content areas:

1. Characteristics of biodiversity in the coastal zone and their use to mankind,

2. main causes for biodiversity loss, and

3. main approaches for conservation of biodiversity.

It is suggested that these three main areas are elaborated using examples from the case study area or region. This would include details of specific habitats (e.g. coral reefs, mangroves) and conservation plans.

Coastal zone biodiversity

The term biodiversity is used in a variety of ways; species richness (i.e. the number of species per unit area), species diversity (the number of species in relation to the number of individuals), genetic diversity (the genetic pool within-species, or across a group of species or communities), or as a more general term for living biological resources.

Teaching tips

Participants will need to have knowledge on:

- Characteristics of biodiversity.
- Loss of biodiversity.
- Conservation of biodiversity.

Coastal zone areas are high in biodiversity. This is due to two interrelated reasons:

- The coastal area forms a link between the land and the sea, and thus this covers a wide range of different community types, e.g. from the arid hinterland to coastal up-welling regions offshore.

- Due to high energy, sediment and nutrient inputs in coastal areas, they tend to be highly spatially heterogeneous, thus permitting the development of a wide range of communities over a small spatial scale.

Throughout history, mankind has utilised biodiversity for food, shelter, clothing etc. In traditional societies usage of the re-

sources tends to be direct, e.g. eating fish. However, in more developed societies social and economic networks build up around biodiversity, e.g. fisheries marketing, processing and transport; timber felling, transportation and carpentry. The wider international community also has a non-use value from biodiversity. This can be in terms of development of medicinal purposes or other aspects, such as non-toxic coatings for ships to prevent biofouling.

Exercise

Using the case study area as an example, assist the participants in listing the **direct** and **indirect** uses of biodiversity.

Try to link up the direct and indirect users into webs to demonstrate the complexity of the human exploitation system and reliance of a wide number of people on biodiversity.

Loss of Biodiversity

Although many societies are reliant on biodiversity, anthropogenic activities are leading to a global loss in biodiversity. There are many drivers for the depletion of coastal biodiversity. Many of these are related to population pressure and increasingly intensive and destructive activities; a few are shown below:

- Pollution.
- Increase in salinity.
- Tourism.
- Species specific exploitation.
- Fishing by-catch.

Approaches to conservation of biodiversity

There have been many approaches to the protection of biodiversity. Conservation has

been used to protect areas of natural or semi-natural biodiversity through Protected Areas and Marine Protected Areas (MPA's). However, preventing loss of biodiversity in its wide-ranging definition is more related to sustainable development, as it involves the wider social and economic networks identified above.

> Often concepts of **Preservation** and **Conservation** are used interchangeably.
>
> **Preservation** should be used to describe the long term maintenance of species, habitats or ecosystems. Importantly, little, or no, human use is implied.
>
> **Conservation** describes the maintenance of a *status quo* and implicitly includes a notion of human use of resources as well as recognising the natural variability of natural systems which can cause changes in the status of species, habitats and ecosystems.

Conservation has been used widely to protect biodiversity. Considerable efforts have been made to protect and breed certain endangered species, and to protect areas with inherently high biodiversity. However, creation of protected areas can lead to the loss of livelihoods of many of the rural poor. Thus for long-term sustainability, conservation needs to be inclusive of local stakeholders.

A number of approaches to conservation are shown below:

- Declaration of Protected Areas in the coast.
- Species-specific conservation efforts for the endangered and threatened species (e.g. IUCN categories).

- Restriction of prawn seed collection in order to save coastal aquatic diversity.
- Pollution abatement measures against oil slicks or thermal effluents.
- Awareness and education camps.
- Generating alternate employment.
- Providing special eco-development programme for local people around Protected Areas.

Management strategies

In order to conserve biodiversity management strategies need to identify issues in terms of:

- Governance to address conflicts between interests and users and promote economic and social well-being,
- system complexity to address issues relating to resources characteristics and harvest-culture factors and the sustainable exploitation of resources in economic and socio-cultural aspects, and
- institutional structures and tools to aid the implementation of management strategies.

> **Exercise**
>
> Using the case study area, or areas that the participants know well, list the drivers for the **loss** of biodiversity.
>
> You should be able to identify many drivers. At the end of the session distinguish between general processes such a population pressure and development, and specific drivers such as increasing organic pollution.

Points for the Conclusion

Emphasis should be given on:

- Awareness that biodiversity is a very important resource on which many societies are based.

- The fact that there are many drivers that impact negatively upon diversity and that maintaining biodiversity is linked to sustainable development.

References

http://www.biodiv.org/programmes/areas/marine/. Information relating to the Jakarta mandate on coastal and marine biodiversity.

http://www.unep-wcmc.org/. the world biodiversity information and assessment centre of the United Nations Environment Programme.

http://www.unep.org/about.asp. Information on the United Nations Environment Programme (UNEP) to encourage sustainable development through sound environmental practices.

http://www.unesco.org/csi/theme/them6.htm. Outlines UNESCO wise practices for coastal biodiversity.

http://www.unesco.org/csi/theme/them8.htm. Outlines UNESCO wise practices for protected areas.

Module 1, Session 7: Coastal Protection

Keywords: Shore protection; Methods of coastal protection; Impact of protection; Shoreline management; Disaster management.

Learning Outcomes

At the end of this session participants will:

- Have acquired basic knowledge on the types of coastal protection.

- Have gained an understanding of the options for shoreline management.

- Have become aware of utility and impact of coastal protection.

Relevance to ICM

Coastal processes and occurrence of extreme events always create problems and poses serious threat for the coastal environment. To protect the coast, construction of coastal protection structures is a common response.

The vulnerability of the coastal community to global/local climate change (like sea level change, erosion/accretion, increased intensity and/or frequency of cyclone/storm surge, pollution, etc) may sometimes conclude with an option of constructing some kind of coastal protective measures. It may solve the problem at a local scale, but needs careful examination so that it may not create some other unwanted problem in the long run locally and/or regionally. Thus, within ICM, it is necessary to consider all the facets of coastal construction and its probable impact.

Indicative Content

Coastal protection can come in many forms. Some forms are soft options and some are hard options, which differ in inputs and impacts. The contents should address natural protection (i.e. soft options) available such as sand dunes, reefs, coastal vegetation, etc. and their advantages.

Shore protection should be designed after proper monitoring and the assessment of coastal ocean. Also, there should be a detailed impact assessment study before installing the proposed construction. For example, if we are going to protect an eroding beach and construct one impermeable groin, it may serve the purpose, but may create severe erosion on the downdrift side of the groin.

> **Teaching tips**
>
> Participants with different specialization need to have simple clarification on the engineering aspects. There need not be technical / mathematical explanations, rather simple examples and illustrations may facilitate easy understanding.
>
> Diagrammatic presentation is necessary for the simple conceptualisation of the role of coastal protection in ICM.

The basic areas of content that could be described are:

- Description of various types of coastal protections (hard and soft options).

- Selection of proper coastal protective measures.

- Understanding of resultant impacts for any coastal protection.

- Impact of coastal protection measures on other physical & biological parameters and on the society.

- Examples of shoreline protective strategies within the study area.

> **Exercise**
>
> The participants can discuss the basic designs of a selection of coastal protection measures with the help of photographs, diagrams and study maps. The group can be asked to study consequent changes from the possible interaction between coastal processes (like littoral drift) and the artificial structure (like a groin) on a given set of maps, diagrams, models, etc.

Points for the Conclusion

Emphasis should be given on the:

- The understanding of basic knowledge on different protective measures and function.

- The effects of the constructions on other physical, biological and human environmental parameters and management needs.

References

http://www.unesco.org/csi/theme/them2.htm. Outlines UNESCO wise practices for coastal erosion.

http://bigfoot.wes.army.mil/cem026.html. Coastal Engineering Manual.

Module 1, Session 8: Coastal Pollution

Keywords: Sources and types of pollution; Pollution management; Impacts of pollution; Carrying capacity; Dispersion.

Learning Outcomes

At the end of this session participants will:

- Have gained a knowledge base on different sources of pollution and different types of pollutants.
- Have become aware of the impacts of pollution.
- Have considered some of the possible mitigations of coastal pollution hazards.

Relevance to ICM

Rapid urbanization and increasing demand and dependence on coastal resources are causing coastal pollution. From habitation, industry and other important human activities there is an immense pressure on the coastal environment. For instance, discharge and disposal of solid and liquid wastes, industrial pollutants, and oil damage the environment. Even events distant to the coast cause problems for marine organisms. Upstream overuse of pesticides may lead to bioaccumulation.

Pollution may become a strong hurdle for further industrialization and can hamper the tourism, besides causing harm for the natural environment. Consequently, pollution management should have an integration of all relevant coastal activities and it is an essential component of ICM.

Indicative Content

The urbanization and rapid industrialization are the primary sources of coastal environmental pollution. So, the knowledge about the sources and causes of pollution and different types of pollutants, their individual effects on the coastal environment is essential.

The understanding of movement and dispersion of pollutants due to different physical forces is essential to monitor and mitigate the problems of pollution. Pollution mitigation measures should be integrated in ICM plans. The session content could be organised around the themes of:

- Describing various types and sources of coastal pollution.
- Understanding on the coastal pollution hazards and resultant impact.
- The cause and effect scenario of coastal pollution and its impact on other environmental domains.
- Pollution management in view of ICM.
- Wastewater and solid waste management.

On the basis of the above ideas the following aspects may be covered:

- Sources and types of coastal pollution and pollutants,
- impact of coastal pollution on other physical & biological parameters and on the society, and
- linkages with physical, climatic parameters and other biological and human components, and

- legislation and standards, "polluter pays" and such principles.

- Examples of mitigation strategies and possible management approach within ICM.

Exercise

- Since the participants are from different fields of specialization, the basic conception on coastal pollution should be made clear through group discussion and sharing some examples.

- The groups may be given background reports on pollution of the study area and asked to discuss about the extent of problems and issues associated with it.

- The groups may be asked to visualize the possible mitigation strategies in view of ICM.

Points for the Conclusion

Emphasis should be given on the:

- Understanding of different sources and types of coastal pollution.

- Creation of awareness of the effects of pollution on other physical, biological

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Teaching tips

- Participants from diverse backgrounds need to be exposed to the basics of coastal pollution and types of pollutants.

- Explanation on various hazards due to coastal pollution, with some case study examples.

- The effect of coastal pollution and possible impacts should be emphasized. Linkage with other components of the coast and possible methods of mitigation within the ICM must be highlighted.

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and human environmental parameters and management needs.

References

http://www.epa.gov/owow/nps/MMGI/. Guidance Specifying Management Measures for Sources of Non-point Pollution in Coastal Waters from the USA EPA.

http://www.bio.hw.ac.uk/marine/DIR/POLL2.HTM. Useful information and links on coastal pollution.

http://www.ocean98.org/envir.htm. Information on the coastal environment and pollution.

Module 1, Session 9: Functioning of Coastal Ecosystems

Keywords: Mangrove; Coral; Sea-grass; Productivity; Export; Dune and Lagoon ecosystem.

Learning Outcome

At the end of this session participants will:

- Have gained an insight of the major ecosystems important in ICM.

- Be aware of inter-linkages of major coastal ecosystem to ensuring better management.

- Have a background to externalities influencing coastal ecosystems, which in turn influences the social benefits and services harnessed from them.

Relevance to ICM

Coastal ecosystems are important for environmental function and sustainability. They provide goods and services to individual and societies. We can conceive of coastal ecosystems in two broad ways. In a more traditional natural science paradigm, coastal ecosystems comprise of systems, such as coral reef and sea-grass, mangroves, dune and lagoons. From a broader human ecology perspective, the ecosystem consists of the above but also includes humans as a functioning element of the ecosystem. The difference in how each paradigm views humans (as exogenous in the former and endogenous in the latter) has important implications for how coastal management thinking is framed.

Humans make extensive use of the resources yielded by coastal ecosystems. They also often settle in coastal areas and coastal livelihoods develop in close symbiosis with the particularities of the natural coastal environment. While the relationship between humans and other aspects of the coastal ecosystem can easily result in the degradation of elements of the natural system, the principle of sustainable development suggests that management we can aspire to a more balanced relationship between humans and natural systems.

Coastal ecosystems such as coral, sea grass and mangroves and their resultant functions, form important items of coastal resource management in the context of ICM. Some particular areas are often managed by declaring them to be "protected".

Indicative Content

In this session attention is focussed on major coastal ecosystems and their interlinkages. The goods and services they provide to society are included. The causes of damage and possible mitigations are also mentioned.

Importance of ecosystems

Coastal ecosystems are very productive on the one hand and fragile on the other.

They are important for the following reasons:

- The Shore is protected by major coastal ecosystems (corals, seagrass, mangroves) from storms, gales, surges, waves. Mangrove and seagrass' trap sediments.

- Many ecosystems provide excellent fishery resources.

- Major coastal ecosystems act as nursery and pasture for coastal aquatic animals.

- Many ecosystems provide excellent recreational facilities for tourism.

- Some mangrove plants, coralline algae and animals are potential providers of anti-cancer, anti-virus and bone-graft materials for society.

- Ecosystems can help minimise the impact of global warming by sequestering large amount of carbon in the form of calcium carbonate (corals), in the form of biomass.

- Coastal lagoons are an important source of fishery resources.

- Estuaries can function as replenishment zone for coastal and offshore fisheries.

> **Teaching Tips**
>
> It is a good idea to discuss the role of ecosystems, both individual and collectively, in the context of landscape ecology. Emphasise the function that individual ecosystems play in the support and maintenance of surrounding ecosystems, as well as the function of provision of goods and services to mankind.

Drivers of Coastal Ecosystem

There are many drivers of coastal ecosystems, which operate over a range of space and time scales. Generally, large spatial scale processes (e.g. natural subsidence) operate over a long time scale, whereas small spatial scale processes operate over a relatively short time scale. To appreciate the dynamics of the functioning of coastal ecosystems requires a level of awareness of the suite of drivers and their associated scales in time and space.

Natural drivers such as erosion/accretion process, currents, global warming, algal blooms can bring about changes. For example:

- Changes in coastal water quality (such as suspended sediment load, surface water temperature, dissolved oxygen, causing depletion of coastal ecosystems.

- Natural subsidence/upheaval can cause changes in salinity of coastal water causing impact on mangrove ecosystems.

Anthropogenic drivers, such as change in land use, diversion/damming of rivers, establishment of industry or ports, tourism, reclamation and resource exploitation can induce changes, such as:

- Spread of aquaculture that can often take place at the expense of mangrove.

- Over exploitation of mangroves for timber and fuel wood reduces the total area of mangrove coverage.

- Brickfield activities have often been expanded at the expense of mangroves.

- The hot effluents from thermal plants can impact upon corals.

- Dredging can harmful for many coastal ecosystems.

- Diving tourism can lead to degradation to corals and other ecosystems.

- Construction of upstream dams can affect many downstream estuarine and coastal ecosystems.

- Loss of areas to provide space for human settlement.

Possible management interventions

- Declaration of protected areas.

- Declaration of "buffer zones".

- Prevention of diversion/blockage of creeks and rivers can ensure sustainability in mangrove forests.

- Control of indiscriminate establishment of industry.

- Consider careful the environmental impact of upstream dam construction.

Teaching tips

Frequently asked questions are:

- Are there any success stories on ecosystem management?

- How can we protect ecosystems?

- What is the reason for failure in implementing existing plans?

The trainer should have knowledge on a number of case examples.

Points for the Conclusion

- The functions of ecosystems can provide services to society. However, society can impact upon coastal ecosystems and limit or destroy their functions.

- Consequently, the services provided by ecosystems and the impact of their loss needs to be addressed within an ICM plan.

References

http://www.wcmc.org.uk/marine/. Information on tropical ecosystems.

Module 1, Session 10: Policy and Governance in ICM

Keywords: Policy, Goals, Actors, Political System, Governance, Decision-making, Legislation, Power, Voice, Civil Society.

Learning Outcomes

At the end of this session participants will:

- Be aware of potential contradictions between macro policy frameworks and local needs and how these can arise in the policy process.

- Have considered the potential problems of planning and implementation for a particular physiographic unit where the boundary of which may not coincide with an administrative planning boundary.

- Have reflected on how international and national laws relating to coastal management inform coastal policy agenda and subsequent interventions.

- Have been encouraged to reflect on how the implementation of a policy may lead to both intended and unintended outcomes and thus the need for responsive and informed management.

- Be aware of the role for participatory approaches in policy making and plan formulation.

Relevance to ICM

Policy attempts to influence the socio-economic drivers that generate changes on the coast. Integrated management and planning considerations often tend to cut across political boundaries, which further complicate the process of management, policy implementation and governance.

The political system segments space into administrative units which may not map onto the physiographic boundaries. The coastal zone is a physiographic unit with its associated ecosystem and social system characteristics (including common property rights in places) that cuts across State boundaries. In a democratic federal political structure policymaking, plan formulation and implementation require coordination between central and regional government structures.

Policy formulation is the output of a complex political system. Implementation of a broad policy requires framing of laws, drawing up coastal zone plans that are implemented within the administrative context. The policy requires internal, horizontal and vertical consistency and coherence to be successfully implemented at the micro level within the planning horizon.

Policymaking often reflects the politics of power and thus may encounter constraints in the process of prioritisation and meeting implementation goals. Power commonly lies with the wealthy and/or politically advantaged groups in the system. However the increased emphasis on people's participation and decentralisation is designed to give an opportunity to increase the voice of more marginalized groups in the policy process. This may be mediated through civil society groups. The non-participation of a particular group may lead to the failure of

some of the plan components or undermine the principles of sustainable development.

Indicative Contents

The key message that this session should address is that policy is neither formulated nor implemented in a socio-political vacuum, but is a socially embedded process conditioned by and conditioning what occurs in the 'real world'. Therefore the implication for coastal management of perceiving policy as the result of 'webs of decisions' is that analysis needs to be sensitised to the fact that the policy process is both constituted by and a result of the exercise and distribution of power. Exiting distributions of power limit effective participation in the policy-process, regardless of whether these systems are nominally labelled 'democratic'. The existing distribution of power defines the roles of actors, determines the issues to be included and excluded from policy agendas, shapes the behaviour of actors through the rules of the game and privileges certain interests not only by according access but also by favouring preferred policy outcomes. In this awareness, a key objective of the session is to begin to enable participants to carry out an analysis of policy options in order to assess the likely 'implementability' of policy proposals. Policies which are 'good in theory' but which are entirely impractical in the face of the reality of politics are likely to result in a substantial waste of resources. The lecture should also consider the coastal manager's role and the implications for more effective approaches on integrated coastal management. The content of the session could be organised around the following themes.

Exercise

One of the following activities could be included in the session.

Current policy coherence

Course participants are asked to reflect on the current policy regime in the country as it pertains to coastal management and consider to what extent there is vertical and internal consistency in a policy area and horizontal consistency between sectoral policies. Participants should be asked to give examples based on their own experience where they consistency and inconsistency in coastal policy. The can be done in a large groups or in small groups that would report back with interesting examples of consistency and inconsistency. The facilitator should prompt as to the implications for a planning and management process in the coast.

or

Coastal problems and policy responses

Group discussion with reporting back on the following questions:

- What are the origins of problems and issues that are facing the coastline? (Time and space issues)?

- To what extent are the impacts on people today due to multiple/synergistic/single cause changes?

- To what extent have environmental law/policy relieved/exacerbated problems in coastal areas?

Competing Views of the Policy Process

Presentation of the two distinct ways in which the policy process can be viewed:

1. The hierarchical policy process view = in this the formulation, implementation and evaluation of policy is an ordered, sequential and purposive process. It

brings together self-contained but mutually dependent policy stages and actors. Classically, agenda setting – policy formulation – legislation – implementation – evaluation. Here there is a strong emphasis on policy statement and then the subsequent arrangements for translating that statement into outcomes. It is presumed that "policy is what policy says". This view emphasises a separation between political phases of policy formulation and administrative phases of implementation.

2. The political systems view = in this policy is the output of negotiations within political systems at all levels in the policy process. Negotiations occur between actors who hold either converging or competing views and who have different interests in relation to the policy issues. These actors seek to articulate and then actualise particular objectives at all levels of the policy process from formulation, through implementation and on to evaluation. Here policy evolves therefore not from a single rational decision, but from a "webs of decisions". Here the emphasis is on understanding the policy outcomes as the product of political systems. It takes the view that it is better to understand "policy is not what it says, but what it actually does".

Policy Content

Discuss the challenges of integrated policy-making and integrated planning – e.g. in relation to coherence within and between policies and plans. This should be explained in relation to the content and context of a policy. Content refers to an analysis of the ways in which the details of policy may af-

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Exercise

Aspects of good policy analysis

As a brainstorming exercise or in small groups with reporting back to the plenary, the participants are asked to consider what in their view are the key aspects of good policy analysis.

Check list to consider group responses against

- Problem stated clearly; defined broadly enough to support an effective response.
- Thorough analysis, in light of available time (background info/data, impact analysis, jurisdictional comparisons, stakeholder views).
- Goals clearly articulated; options evaluated against goals.
- Proposals consistent with broader government agenda.
- Policy and implementation risks identified; risk management strategies developed.
- Language is clear and concise.
- Creative, not just the old approaches rehashed in new language.
- Accurate – evidence based.
- Delivered on time.

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fect different people. Lowi offers a three ways categorisation of types of content. These are: distributive, redistributive and regulatory. Policies, which have content according to these different types, will meet with different responses from people affected by them. Context refers to an analysis of the wider factors which must be considered in order to complete an analysis of the 'implementability' of a policy proposal. This will include an analysis of the existing distributions of power, charting where resistance

155

to a policy proposal may be located. This is largely achieved through a stakeholder analysis (See the stakeholder analysis section on p74). Other aspects of context consider spatial, temporal and sectoral differences in order to illustrate the realities of the planning process.

Emphasise the need to look for consistency in the current policy or set of policies in the coast. And that doing this enables coastal managers to gain insight into how effective a particular policy regime maybe as well as identifying potential entry points for strengthening the coastal policy process. In summary three concepts can be alluded to:

1. Internal consistency: among problem definition, goals, and instruments,

2. vertical consistency: programs/activities undertaken are logically related to the policy, and

3. horizontal consistency: policy decisions in one sector do not contradict policies in other sectors.

Evidence based policy and prioritisation in planning and management

Highlight the need for policy to be informed by evidence and to have process for prioritisation in plans at micro, meso and macro levels. This may include discussion on challenging the assumption that the process of resource allocation must still be guided by technical and scientific expertise, and that 'policy planning and decisions' define 'policy implementation and management'. In this scenario, those with less voice are the most vulnerable. Therefore there are requirements for evidence to be generated and used to modify policy in order that the

interests of these groups are incorporated in order to prioritise effectively.

Effects of planning boundaries

Discuss the constraints arising when boundaries of administrative units and the geo-physical units in a plan operate at different scales - explain with examples. These could be at a very local level or at larger scale associated with the intra-country or international boundaries.

Regulation and enforcement

The implementation of any plan requires the knowledge of regulations that have been enacted as laws both international and national (e.g. identification and maintenance of Biosphere Reserves, the Coastal Regulation Zones and the prohibitions of construction within it) and the mechanism of enforcement of the legislations. Promotion of people's participation in the process of plan formulation, plan components and policymaking can act as an internal check on the violation of the formal regulations.

Governance and voice

Understanding the rights and knowledge of the multiple stakeholders, and allowing these to inform policy decisions and implementation is the defining feature of a governance agenda in coastal zone management. This again reinforces the statement that coastal policy is more a political than a technical task. Increasing participation at the grass root level is designed to enable the stakeholders with lower level of influence to raise their voices to uphold social justice and prevent violation of legislations even by those with power and influence. This can take the form of public litigation often mediated through civil soci-

ety organisations representing particular interest groups or constituencies.

Points for the Conclusion

Summarise the following points as being pertinent to recall when putting together an integrated coastal management plan:

- Identify the expected implications of feasible options, and how they link to broader agenda

- Understand goals and constraints especially when goals may be vague and there are constraints which may be both technical and political

- Emphasise the requirement for understanding views and expected reactions of key stakeholders (with or without formal consultations).

- Ensure a selection of a number of possible policy instruments

- Identify risks and risk management strategies.

References

Rebecca Sutton 1999. *The Policy Process: An Overview.* Working Paper 118 Overseas Development Institute.

http://www.odi.org.uk/publications/wp118.pdf.

Piers Blaikie and John Soussan (2002). *Understanding Policy Processes, Livelihood-Policy Relationships in South Asia* Working Paper 8 Improving Policy-Livelihood Relationships in South Asia Project, Leeds University. http://www.geog.leeds.ac.uk/projects/prp/pdfdocs/policyprocess.pdf.

Oliver Springate-Baginski and John Soussan (2002) *A Methodology for Policy Process Analysis Livelihood-Policy Relationships in South Asia*. Working Paper 9 Improving Policy-Livelihood Relationships in South Asia Project, Leeds University. http://www.geog.leeds.ac.uk/projects/prp/pdfdocs/polmethod.pdf.

Matthew Chadwick (2002) *Integrated Coastal Zone Management in Bangladesh*

Exercise

Understanding policy and governance

In this session the following areas, focused on the country on question, can be explored.

- How, by whom and who for is coastal policy made in the country?

- How has civil society played a role in policy formulation and which stakeholder groups have the greatest influence?

- To what extent is the addressing of coastal issues/development a political question?

- How is information channelled into the policy cycle?

- Is coastal management an issue of good governance?

- What systems of checks and balances for governance exist and do they work?

- How do street-level bureaucrats influence the outcomes during implementation?

- Who has responsibility and accountability for implementing the plan at different levels?

It would be interesting to compare the reality with what is considered good practice in a democracy. The number of questions addressed should be dependant on the time available. Small groups could discuss a different selection of questions.

ALTERNATIVELY, THESE QUESTIONS COULD BE USED AS PROMPTS DURING THE SESSION

A Policy Review. Working Paper 6 Improving Policy-Livelihood Relationships in South Asia Project, Leeds University. http://www.geog.leeds.ac.uk/projects/prp/pdfdocs/bangcoast.pdf. A description of a coastal policy regime, covering the evolution and current focus of ICM in Bangladesh.

Norman Uphoff (1998). *Community-based natural resource management: Connecting micro and macro processes, and people with their environments.* Paper presented at International CBNRM Workshop, Washington, D.C., May 1998

http://www.frameweb.org/pdf/CBNRM_micro_macro_processes.pdf. Contains material for stimulating ideas for lecture content that seeks to describe the interconnections between people and processes operating at different levels in the context of natural resource management. These ideas could form the basis of a session on the ICM course if coastal examples are used to illustrate the ideas.

Module 1, Session 11: Spatial and temporal information

Keywords: Image Processing; Satellite Imagery; Geographical Information System (GIS); Thematic Mapping; Time Series Analysis; Maps; Charts; GPS; Spatio-temporal Interaction.

Learning Outcome

At the end of this session participants will:

- Have gained an awareness regarding the data collection and collation procedures.

- Have an understanding of a modern tool for monitoring and evaluating global change and ecosystem evolution and coastal use structure.

- Been reminded of the significance of spatial and temporal interactions in the planning process.

Relevance to ICM

Practicing coastal managers need tools that allow the display of spatial and temporal data from a variety of sources that are compiled using a variety of different techniques. Managers also need to be aware of the different methods that are used in order to be able to interpret the information presented within maps and charts in the context of deriving solutions/options for decision making.

Since coastal zone management needs to take into account the processing of spatial as well as temporal information in the context of various activities of the coastal zone, an understanding of the attributes of different imaging systems is necessary.

Geographic information technologies – Global positioning systems (GPS), Remote sensing (RS) and Geographical information systems (GIS) – are technologies for collecting and dealing with geographical information. Geographical information is:

- Information about places on the Earth's surface,

- knowledge about where something is, and

- Knowledge about what is at a given location.

Indicative Content

Remote Sensing

Remote sensing is defined as deriving information about the earth's land and water surfaces from measurements of reflected or emitted electromagnetic radiation. In order to make an assessment of the management value of remotely sensed images, it is important to understand:

- Remote sensing depends on observed spectral differences in the energy reflected or emitted from features of interest.

- Every sensor has limitations with regard to the resolution of features it is able to separate on the ground. These smallest aerial units are known as a picture element or pixel.

- What is recorded and at what resolution depends on the choice of sensor and the altitude from which it operated (100s meters for aerial photography cf. 100s kilometres for satellite imagery).

- Every remotely sensed image represents a landscape in a specific geometric rela-

tionship, operating condition, terrain relief and other factors.

Remote sensing has made possible the production of aerial photographs and satellite images that can be used for interpreting the physical and biological features of the earth and the changes in them. Participants should be informed that interpretation of satellite images need verification and validation on the ground, which requires fieldwork. Remote sensing images can be used in geographical information systems (GIS) for collation with data obtained from other sources as discussed later. Participants should be made aware that digital image processing of the satellite images may be used to provide important inputs for GIS.

Aerial photographs are appropriate for three-dimensional representation and analysis. They can easily be displayed in the form of smaller scale maps (e.g. 1:4000 scale).

Radar images are often used to monitor cyclone tracks in order to provide timely warnings to communities residing in the coastal zone and fishermen at sea. These are important for risk and impact assessment for disaster mitigation.

Imagery data and their sources	Other data
Satellite images, Radar data, Sonar Echogram, Aerial photographs.	Synoptic Chart, Tide chart, National Survey Maps and topo-sheets, Measured socio-economic and environmental data, Cadestral Map, Ground water Map, Thana Map.

Image analysis

This is concerned with the extraction of important features from image data from which description, interpretation and understanding of the displayed scene can be provided digitally. Image analysis basically involves the study of feature extraction, segmentation and classification techniques. If time allows, participants should have an overview of the following procedures and elements:

- Digital Number.
- Image Enhancement.
- Image Restoration.
- Contrast stretching.
- Filter.
- Histogram.
- NDVI.
- Image Composition.
- Image Classification - Supervised, Unsupervised.

It can be useful for participants to be aware of the names of software used for Image processing, such as:

- ERADAS.
- WINBILKO (Freely available from UNESCO).
- IMAGEWORKS ILWIS.
- TNT MIPS.

Geographical Information System

A GIS is a set of computer tools designed to efficiently capture, store, update, manipulate, analyze and display all forms of geographically referenced information. Present day technology of managing and analysing different types of data with the use of com-

puters has resulted in the designing of software that can efficiently capture, store, update, manipulate analyse and display all forms of geographically referenced information. This has now become a tool commonly referred to as GIS.

Using GIS the information on various attributes of coastal elements can be stored in the form of data and can be displayed spatially on maps through GIS. Many forms of data can be presented on a GIS, both physical and human. GIS can provide a methodology for mapping various types of socio-economic data (such as population density, growth rates, literacy, crop combinations, cropping intensity, yield, per capita income etc.) and then superimposing the individual thematic maps to produce a composite picture that will help the manager to understand the problems and solution options in a spatial context. This method helps to identify and prioritise spatial units for planning purposes.

In GIS the tasks undertaken may be

- Spatial identification.

- Trends.

- Patterns.

- Modelling.

- Thematic map preparation.

- Redistricting.

- Graphical analysis.

- Preparation of expert system for simulation modelling and optimisation.

A variety of GIS software is available for preparing maps, including:

- ERDAS Vector module capable of producing GIS maps from classified infor-

mation on images already carried out using image processing technique, this feature is typical to this product.

- ARCVIEW is a workable cheap software for coastal studies.

- MAPINFO is also very user friendly cheap software for GIS work and can be more versatile to produce 3 dimensional impact on map if used with another software Vertical-Mapper.

- ARCINFO is the most efficient versatile GIS software but very costly to procure.

- SPANS is also another product but less efficient than other GIS product.

Interactions in space and time scales

The data collected from various sources are representative of processes varying over different time and space scales. In ICM, analysis on the basis of this information is carried out to identify nature of coastal planning for different spatial and time scale. It must be noted that the timeframe and spatial extent over which the planning have to be made should be in conformity with time and spatial extent mentioned in TOR. In ICM, it is essential to understand the scope of planning over different space and time scales.

Resource mapping

The outputs from remote sensing and GIS is usually in the form of a resource map that can be used to provide information to a user who could be a manager, decision maker or any other stakeholder. To ensure the information provided is useful it is important **before** starting remote sensing/GIS project:

- What do the end users really want to know?

Examples of interactions at various space-time frame

1. Geomorphological feature in:

- Micro scale: estuary channel cross section, beach profile ripple marks,

- meso scale: spits, mud flats, sand dunes, barrier bar, and

- macro Scale: Capes, Bays, estuaries, shoreline delta.

2. Land use characteristics due to:

- Micro scale: conversion of mud flat to aquaculture,

- meso scale: reclamation, change in forest cover,

- macro Scale: water-shed changes due to construction of barrages or dams.

3. Socio-economic characteristics due to:

- Micro scale: Development of Pockets of poverty, intra-village conflicts,

- meso scale: Development of Inter-village conflicts over small fisheries, Spread of inter-state conflicts of fishermen, and

- macro Scale: Change of trade policy due to North-South divide.

- What information is needed to describe a resource?

Management applications

Mapping of spatial and temporal information can be used to support the ICM process through:

- Habitat mapping.

- Mapping water quality.

- Resources assessment.

Points for the Conclusion

Emphasise should be placed on:

- The role of GIS as a management and decision-support tool.

- The need for mapping to be focussed on the needs of managers.

References

http://rst.gsfc.nasa.gov/start.html. Remote sensing tutorial from NASA.

http://www.csc.noaa.gov/crs/. NOAA program linking coastal resource managers with meaningful data, information and products derived from remote sensing technology.

http://www.unesco.org/csi/pub/source/rs.htm. Remote sensing handbook.

Module 1, Session 12: Environmental Economics: - Monetary Valuation of Environmental Resources[1]

Key words: Environmental Economics; Decision Tools; Benefit Cost Analysis; Monetary Valuation Techniques; Total Economic Value; Stated preferences; Revealed preference.

Learning Outcomes

At the end of this session participants will:

- Have gained an overview of the application of environmental valuation techniques and their place in the ICM process.

- Be more familiar with the language and terminology associated with environmental economics and valuation and thus become more confident in engaging with or commissioning environmental economists.

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[1] This text draws on a lecture given by Allister Hunt of the University of Bath on the ICZOMAT course in August 2000.

Relevance to ICM

In planning and management there is a long history on the use of economic analysis to inform decision-making. In recent years, as governments have become more concerned about sustainable development attempts to value natural resources in order to undertake more informed decisions with respect to policy and interventions have become more commonplace. Within ICM participants should be aware of the environmental resources associated with coasts and the need to take them into account when developing and implementing management plans. The valuation of environmental resources is an additional tool to apply alongside the other approaches to the analysis to coastal problems that the coastal manager has at their disposal.

Some of the environmental resources of the coast, for example fisheries, have markets which provide price information that can enable estimates to made of the value of the associated benefit streams. Other resources of the coast, for example a recreational area of beach, do not have conventional pricing mechanisms. However, their value needs to be considered if a coastal manager is to advise on realistic management options, e.g. for a length of popular recreational beach threatened by erosion or pollution that will reduce its amenity value. If only the affected features that have real markets were taken into account, the true value of the resource may be significantly under estimated. Basic understanding, of environmental economics and the valuation of environmental resources, is therefore useful for the coastal manager.

Indicative Content

A session with this focus should at least make the coastal manager aware of the fundamental concepts and processes of environmental valuation, as well as making the delegate more familiar with the language used.

This session highlights the methods by which environmental impacts can be put

into monetary terms. The approaches described below for possible inclusion are built around the principles of benefit cost analysis. The session will look at how values can be assigned to environmental features where conventional market mechanisms do not give monetary values for the cost benefit calculation. While, this approach while not universally accepted in all circumstances, it is useful to present the outlines of the arguments for and against use of environmental valuation. In particular to debate whether it provides the 'answer' to sustainable development questions, or is just a 'tool' that informs analysis and decision making.

The content of the session could be organised around the following themes:

Why is monetary valuation of environmental assets needed?

It is recognised that monetary valuation is important for the following reasons:

> **Teaching tips**
>
> - In lectures and handouts the speaker should be able to convey in a non-technical manner the advantages and disadvantages of a particular technique with the main assumptions that are underpinning as well as any major criticisms for an approach.
>
> - Ideas should be given regarding when it is appropriate to use particular approaches for commonly observed issues in coastal areas and where possible to give real examples of their application.
>
> - Some idea of the complexity and cost of commissioning environmental valuation studies would also be useful.

- It is a reminder that the environment is not free, even though there may not be a conventional market for its services.

- It helps to redress the balance between quantifiable and non-quantifiable effects in cost-benefit analysis and narrows the field remaining for pure judgement.

- Quantification, carried out carefully and recognising its limitations, can provide a more secure basis for policies to promote more careful use of the environment.

Principles of valuation

There could be a section of the session that reviews the main principles of environmental valuation and outlines the basic ideas behind using them in the context of coastal management. The following are suggested:

- Benefit cost analysis: a decision-making tool for which monetary values of the environment are derived.

- Total Economic Value: To simplify the task of valuation we can disaggregate environmental impacts into individual components of value. The most commonly used approach is based on the concept of Total Economic Value (TEV).

TEV is generally divided into three categories:

- Direct use value; (e.g. marketable fish),

- indirect use value; and (e.g. sewage dispersion), and

- non-use value (e.g. genetic biodiversity).

Measures of Economic Benefit

The maximum amount of money an individual is willing-to-pay to obtain a benefit

reflects that individual's intensity of preferences for the benefit. The concepts to review are maximum willingness-to-pay (WTP) and willingness-to-accept (WTA). Both concepts provide a monetary measure of the intensity of an individual's preferences for a good or service.

Monetary Valuation Techniques

With an appreciation of these concepts, an outline of the major types of techniques used to estimate the TEV of environmental assets can be given.

Changes in Production

Determines the type and scale of physical effects on the environment before estimating monetary values and multiplying one by the other.

Cost-based Approaches – Preventative Expenditure and Replacement Cost

The preventative expenditure measure uses the willingness-to-pay concept. The replacement cost technique assumes that the costs incurred in replacing productive environmental assets can be measured and interpreted as an estimate of the benefits presumed to flow from the assets.

Hedonic Property Value Approach

The hedonic property value approach measures the welfare effects of changes in environmental goods or services by estimating the influence of environmental attributes on the value (or price) of properties.

Travel Cost

The travel cost (TC) method is also an example of a technique, which attempts to deduce values from observed behaviour in surrogate markets in order to value site-specific levels of environmental resource provision and, to a lesser extent, quality.

Teaching tips

There exists a substantial literature on this subject (see e.g. Braden and Kolstad 1991, OECD, 1995), much of which is very technical (or see Rao 2002 Ch. 4 for simpler explanations.) So refer participants to useful texts that are easily available – either on-line or in local bookshops and libraries.

Given that most of the audience in the ICM training will be unfamiliar with the language of economics the intention therefore is to highlight the basis of each technique and show how the technique can be applied in a credible way.

This should mean very limited or no use of economic formulae with mathematical notation.

Contingent Valuation Method

In contrast to the valuation techniques described above, the contingent valuation (CV) method relies on structured conversations' to directly elicit the values respondents place on some, usually non-marketed, goods or services.

Points for the Conclusion

- Some scope for the use of each of the market-based techniques in the valuation of environmental benefits in developing countries, but this has yet to be substantially exploited.

- Particular promise holds for the production function approach, contingent valuation methods and travel cost approaches.

- Hedonic models are also suited to valuing sites and services and for urban pollution problems but may be applied to changes in land use.

- It is essential to note that such models often only provide 'orders of magnitude'

to the size of the benefits, and that some inaccuracy is inherent in the nature of the task being attempted. Nevertheless, the values obtained are useful in reaching rational decisions with regard to investments involving such benefits. Furthermore, in many cases the project appraisal team need not carry out the valuations from scratch. They can draw on existing studies, using an approach that has been termed benefit transfer.

- Summarise the general debate and contested questions about the role of environmental valuation as a tool that supports analysis and decisions in ICM.

Exercise

- Break into groups to discuss the major use and non-use values that occur in coastal areas and that may need to be considered as part of a coastal planning process.

- Break into groups and discuss the possible sources of information that could support and environmental valuation required as part of a coastal planning process.

- Have a discussion on the reliability of different data sources and look at ideas to deal with weakness

- Have a discussion on the degree of accuracy required in the data for an environmental valuation study – what are the trade-offs between cost and the precision of analysis for decision-making.

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Various documents are available at the *Biodiversity Economics Library.* A list of material can be found at:

http://biodiversityeconomics.org/pdf/list.pdf.

Valuation links can be located at http://biodiversityeconomics.org/valuation/index.html.

A Coastal Example on Assessing Environmental Values

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Braden J.B. and Kolstad C.D. (1991). Measuring the Demand for Environmental Quality, Elsevier, Amsterdam.

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Idea for a summary table:

Applicability of Valuation Techniques in Developing Countries.

Environmental Impact	Technical Linkage	Behavioural Linkage				
		Averting Expenditure	Hedonic Property	Wage-risk	Travel Cost	Stated Preference
Productivity:						
Soil loss	Y	Y	?	X	X	X
Crop damage	Y	Y	?	X	X	X
Forest loss	Y	Y	X	X	X	?
Habitat loss	Y	Y	X	X	?	?
Fisheries depletion	Y	Y	X	X	X	X
Water quality loss	Y	Y	X	X	X	X
Property damage	Y	Y	?	X	X	X
Resource depletion	Y	Y	?	X	X	X
Human Health:						
Mortality	Y	Y	X	Y	X	Y
Work days lost	Y	X	X	X	X	X
Restricted activity days	X	X	X	X	X	Y
Pain and suffering	X	X	X	X	X	Y
Medical costs	Y	X	X	X	X	X
Amenity:						
Recreation loss	X	?	?	X	Y	Y
Habitat loss	Y	Y	X	X	?	Y
Aesthetic damage	X	Y	Y	X	X	Y
Noise	X	Y	Y	X	X	Y
Other:						
Existence values	X	?	X	X	X	Y
Occupational environ	X	X	X	Y	X	Y
Access to water	?	X	?	X	Y	Y
Sanitation services	X	X	Y	X	X	Y
Travel time savings	Y	X	Y	X	X	Y

Source: Adapted from Abelson (1996)

Module 1, Session 13: Coastal Non-renewable Resources

Keywords: Surface Water; Groundwater; Rocks and Minerals; Oil and Natural Gas; Resource Exploitation.

Learning outcome

At the end of this session participants will:

- Have been introduced to non-living coastal resources and their usage.

- Be aware of some of the impacts of exploitation of resources.

- Have been exposed to wise and effective exploitation methods.

Relevance to ICM

The basic compositions of a coastal zone can be defined as resources whenever they are utilized and exploited. The non-living components of these resources are generated through a number of natural processes and distributed in several manners. Sand mining, extraction of placer deposits and offshore exploration for oil & gas are the common examples. Exploitation of these resources can result in physical, biological and social problems on the coast. So, the basic concepts on optimum use of these resources and environment friendly exploitation techniques are very essential in view of ICM.

Indicative Content

Coastal managers need to identify and encourage mutually beneficial activities in coastal areas, keeping in mind the sustainability concept within ICM. The content needs to revolve around the drivers, their sources/causes for change in the context of ICM. Emphasise needs to be given on the effect of drivers such as economic needs results into over exploitation of resources that changes the coastal environment. The session could be organised around the following areas:

- Describing the types of physical and chemical resources of a coast.

- The relationship with other environmental domains.

- Effects of exploitation of resources.

On the basis of the above ideas the following areas could be covered:

- Different non-living resources of the coast.

- Water, Sand, Mineral, Oil.

- Exploitation and their causes.

- Conflicts with other interests.

- Management of problems associated with exploitation.

- Linkages within the physical, biological and human components.

> **Teaching tips**
>
> The effects of the exploitation of resources, possibly with suitable examples may be highlighted. For example, offshore oil development represents one of the most profitable uses, but it can significantly affect the other uses of the coastal zone, such as fishing, tourism, recreation and marine transportation. Similarly the coastal population needs water for living, which may get eventually deteriorated by over exploitation by different users.

Points for the Conclusion

Emphasis should be given on:

- The impacts of exploitation.
- The need for resource exploitation to be balanced with sustainable development within the ICM plan.

References

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Module 2: Case Study & Fieldwork

Introduction

The case study is central to the success of the course. The ambitious learning outcomes can only be achieved through a well thought out and executed case study that incorporates several days of fieldwork.

In general, case studies can be used as a method to develop the problem-solving, analytical and decision making skills of the participants within the process of ICM. Case studies can be used to support the capacity development that allows synthesis of the multidisciplinary components to produce an integrated response to coastal management issues. From a practical point of view, case studies also help to keep the participants motivated and learning, as they can relieve the monotony of the lecture or seminar-based classroom teaching. Field visits, within a case study, can be used to help apply the knowledge from earlier sessions, to the observation and understanding of real situations.

The coastal zone is a complex environment, where multiple components interact with each other and create a variety of problems which managers and policy makers are called upon to address. Experiencing the reality is the basis for the case study and fieldwork in this course. An immersion in coastal management literature does not give the complexity and subtlety of real world problems experienced through case study and fieldwork. It is also an opportunity for trainees to 'see knowledge' though observing and analysing the interactions and interrelationships of the causes and drivers of change see in relation to biological, physical, social and economic dimensions. Since course participants often come from different disciplines and localities, the challenge for the course training team is to integrate the knowledge they bring from past experience with the knowledge provided during earlier part of the ICM training programme in order to interrogate the reality of the case study site.

The participatory approach taken in this training programme allows the participants to have the opportunity to experience real examples of coastal management issues. To this end this case study component is built around a series of daylong visits to a pre-selected site in a discreet coastal area that has range of easily observable issues.

Teaching tips

Guide participants away from treating the fieldwork as a means of gathering academic information, but emphasise that the anticipated learning outcomes from the case study module are:

- Appreciation of the complexity of the interactions between the human and natural environment.

- Understanding of the level of detail required for developing a workable plan.

In the case study particular emphasis needs to be paid to the concepts, techniques and approaches needed to encompass the social and economic dimensions of preparing and implementing coastal management interventions. Therefore one of the outcomes of this case study element is to increase awareness of and capacity to incorporate social and economic considerations into the

preparation and implementation of coastal management plans.

Selection of Site

The case study area should also have local management significance, e.g. conflicts, resource management challenges, infrastructure protection. However, the scenario in the selected area should not be too involved. Too much complexity in interactions and the interrelationships between the coastal components could cause difficulties for the participants in unpacking the reality and for the training team to cover all the key areas in the limited time frame.

As the timeframe for fieldwork will be limited, selecting a site that is close to the main training venue makes logistics easier, less time is wasted on travel, and participants and trainers remain fresher.

The training team should have sufficient experience and exposure to the case study area in order that they can provide enough primary and secondary data to the participants during the fieldwork. The organiser of the short course should have access to the key organisations in the locality (e.g. local Government, State/Federal Government and non-government organisations such as development NGOs, unions, industry bodies etc.), so that they can be approached for the collection of information. The area should have enough in depth scientific research so that summaries that present current understanding of the dynamic processes can be provided to the participants.

Checklist of points for guiding the selection of case study site

There are several key criteria to consider when choosing an appropriate site for an ICM training programme:

- The site has a range of physical, biological and social components.

- The site is accessible and has clearly observable issues.

- The site has a range of types of .human interventions.

- There are a range of communities that depend on coastal resources.

- There is developmental activity by Government/local agencies.

- Secondary and key stakeholders are available to contribute to the case study.

Planning

Schedule Preparation

Structuring a field visit programme as per the time, date, and training team is one of the key tasks in case study planning. The schedule should be prepared in discussion with the trainers. This will help to clarify the achievable training outcomes and also to identify the necessary resources. The schedule should include timings, people and places to be visited, features to be seen, facilities available and the importance within the study area. In the timings it is important to allow for all timings. It can, for example, take as much as 10 minutes for 30 participants to get on or off a coach! Sufficient time is needed for tea and lunch breaks so that the participants can rest and reflect on the fieldwork. The time available for each part of field visit, including stakeholder in-

terviews, has to be clarified and talked through with the participants.

Fieldwork can be particularly tiring for both participants and trainers, particularly when they are not used to it and the weather is very hot. To maximise the effectiveness of the fieldwork, it can be useful for planning purposes to be sub-divide a fieldwork day into three parts in locations where there are high day time temperatures:

- Early Morning Session,
- Afternoon Session, and
- Evening Session.

Early Morning Session

In this session the participant will go to the field along with some members of the training team. The physical, biological processes and associated human interventions to the natural processes specific to the study area are explained and evidence for these processes observed and noted by the participants. The participants should be guided to record the components and any associated changes. Some key prompts may be supplied to the participants for the collection of appropriate information that has relevance to ICM.

Afternoon Session

This session can be designed for the stakeholder interviews. The participants are taken to the pre-determined stakeholder. The interview may be conducted through structured/informal questionnaires. Participants should have time to structure their questions and to confirm them with a trainer prior to the interview.

Evening Session

Case study management tips

- Engage a person with local knowledge and contacts to organise the timetable.
- Check journey times, toilets, food and refreshment stops ensuring that sufficient time it allocated.
- Confirm and reconfirm timings and venue for meetings with key informants.
- Entire team should be taken in one vehicle for better and uniform interaction during travel.
- Have a back up plan if transport fails or the weather is very bad.
- Carryout a safety and risk assessment and ensure some trainers have first aid skills with a first aid kit.

By the evening the participants will be tired. The final session of the day should be informal, but still effectively seek to summarise the field observation for that particular day through a facilitated discussion. This session should contain a general overview of the field day, identification of issues, confirmation of issues, background to the issues, stakeholders' perception of the issues and stakeholder aspirations. Through these summary sessions the facilitator should guide participants towards obtaining suitable information, which will be required in writing up the report in the coming week.

Logistics

The number of participants and their background is important consideration for planning the logistics. Logistics include the facilities to be provided during field visit (like transport, accommodation, food, recreation etc.) to ensure a comfortable working environment. Suitable transport has to

be identified to reach the study area and the travel agent has to be informed well in advance. Facilities are required within the vehicle, such as air-condition and a public address system, to make the journey more effective, informative and comfortable. Based on the number of days of the field trip, comfortable accommodation has to be arranged. Facilities should ideally include rooms for group discussions and meetings (among the trainees and/or with resource persons), along with communication facilities (telephone, fax, internet etc.) within or close to the accommodation. Based on the participant's preferences a variety of food items should be on the menu. Safe drinking water should be taken on fieldwork especially when extended periods are spent outside in the sun. Having recreation facilities for use during leisure time is useful for both relaxation and team building as it helps to avoid any monotony. Prior to the participants' arrival it is useful to provide an information brochure regarding climate and nature of the area, so that they can prepare themselves accordingly.

Providing background information

Background information, such as maps, books, tables, charts, text materials and scientific articles, audio-visual aids etc. about the study area should be collected in advance. Ideally the background materials should communicate the information clearly on the case study area. However, often this is not the case. Even so, if resources are only of poor quality, for example pages of irrelevant un-summarised data from published reports about the area, then this should still be used as it represents the real situation. Maps should have clear title and

legend regarding the identification of features in the area. Background information may also be collected from the local contacts, like village elders and trade organisations. Participants should be introduced to these materials and provided with time to sift through them. The resources should be kept available in the evenings of the fieldwork and participants should be encouraged to keep dipping in for relevant information.

Teaching tips

Important considerations for ICM questionnaires

- What are the key coastal issues?
- What are stakeholder expectations of any plan to address the key issues?
- What are the likely benefits or costs to stakeholders?
- What resources will the stakeholders commit (or avoid committing) to any planning process?
- What other interests do the stakeholders have which may conflict with the planning process?
- How do stakeholders regard other stakeholders?

Resource persons

Resource persons that can provide real world information about the study area and help fill gaps in secondary data and reports have to be identified for field visits to be successful. They have a key role to play as a key informant who can provide an overview of the issues at the case study site. They help set the scene for the participants and help in clarifying complex issues. They have to be identified and communicated with well in advance to confirm their participa-

tion. They will need a clear briefing about the course in general as well as on their specific role. The best resource persons are those that are approachable as well as being knowledgeable and with a multidisciplinary perspective. As with stakeholder interviews, participants should be given time to prepare relevant questions to put to these resource persons.

Structuring the Questionnaires

The preparation and use of questionnaires can be very important in the ICM training. Through such questionnaires, the participants can experience the collection of real world micro-level information and can compare data with the knowledge-base provided during the earlier days of the course. Questionnaires have to be prepared with the aim of integrating the components of the ICM. The questionnaires should be prepared with an initially open-ended manner, so that variety of information may be gathered Closed-ended questions may also be used at a latter stage for more specific information, arising form the more open-ended questions, or from previously determined observations.

Selection of stakeholders for interviewing

For the case study, a small range of stake-

> **Teaching tips**
>
> Preliminary investigations
>
> - Maps, charts and aerial photographs should be examined prior to the field visit, so that participants may become familiar with the geography of the area selected.
>
> - A series of sites should be pre-selected for field visit to cover the significant natural and human components during field visit.

holders should be interviewed by the participants. They should be selected on the basis of the key issues at the locality. Interviews should cover representatives of what are considered some of the primary and secondary stakeholder groupings. Primary stakeholders such as fishermen, who are highly dependent on the coastal resources, can be difficult to manage during such "mock" interviews. Sometimes it is better if senior member of the community is interviewed, however, their opinions might not coincide with the views of less influential individuals. As it is not be possible to interview all the stakeholder groups, some selection criteria for identifying a sub-set of primary stakeholders to be interviewed should be identified (e.g. high degree of poverty, numerically large group). The list of stakeholders could include fishermen,

> **Teaching tips**
>
> Preparing trainees for the fieldwork
>
> In order to get the most out of fieldwork:
>
> 1. Explain how the fieldwork elates to the knowledge module and the fnal write-up process.
>
> 2. Brief on the timetable: where we will go, who we will meet, why we are meeting them.
>
> 3. Supply maps and secondary documents that provide information to support the preparation of the plan.
>
> 4. Describe the use of semi-structured interviews basic techniques, protocol and preparation.
>
> 5. For group work – assign roles: interviewers, recorders.
>
> 6. Clarify briefing and de-briefing arrangements.

farmers, trawler owners, money-lenders, bankers, hoteliers, industrialists, aquaculturists, local authorities, NGOs etc.

It should be noted that in the training environment, there is not time to collect robust stakeholder data. The point of the exercise is to allow the participants experience and become aware of the conflicts in the coastal zone first-hand and to consider the type of approach used to collect stakeholder data. It might be the case that some participants, e.g. from senior positions in government have never communicated directly with primary stakeholders.

Pre-fieldwork briefing

Since the targeted participants can be from various corners of the country and sometimes overseas, it is very important to familiarise them about the study area. During the knowledge week the participants are provided with a general overview on coastal components and activities; these should be revisited in the case study. In order to focus the participants on the key coastal components and activities a briefing before going to field is a must. At this stage, in order to ensure the key elements highlighted are the briefing should focus on the broad themes to understand rather than too much scientific detail.

The pre-fieldwork briefing should be done at least one day in advance by a member of training team who has experience of working in the particular area. The briefing is most effective if the discussion is illustrated using pictures, video, and maps. A checklist of the important coastal components may be provided to the participants as handout.

During the briefing the participants should be informed about the weather expected at the case study site, its distance from the main training venue, food and drinking water arrangements, accommodation, dress code, etc. The participants should be informed about the list of documents to be provided, so that the participants may ask for some more materials if necessary. The participants have to be provided the time schedule and the components of the field visit. There should be a small discussion between the trainers and trainees to clarify expectations and ensure effective field visits.

Running Field Trips

As time in the field is limited, particularly in very hot climates, field visits need to be run very efficiently.

Starting of a field trip

Before leaving for the day, the participants should have looked through relevant secondary data the day before. Summaries of the key points from this data (maps, key features and processes) should be provided in an A4, or smaller, format together with a writing pad, pencil, eraser, clipboards etc.

To keep participants focussed it has been found useful to provide a sheet with structured questions or a checklist of observations which they fill in during the site visit.

On arrival at the field site, and before leaving the coach, the lead trainers should summarise the reasons for the visit and what the participants should be looking for or doing. A coach with a microphone and public address system makes this much easier.

Observation at the field site

Initially the whole group has to be brought together to listen to an introductory explanation about the area, or to listen to local resource persons. Generally a team of trainers is required to do this. Inevitably, one or two participants will walk off in a different direction to look at a canal or buy some biscuits and miss the vital information. The trainers must actively keep "shepherding" the group so it can hear what the lead trainer or resource person is saying. If groups of participants are not listening to the trainer or resource person, then the training team needs to be more vigilant and active in encouraging participation. Keeping

> **Teaching tips**
>
> Making use of travel time.
>
> The participants travelling by coach through the study area can gain much information. Using the public address system the lead trainer should point out interesting features.
>
> Participants can also be primed to carryout of data gathering from the coach. For example, if a suitable blank handout is supplied, participants can record the amount and variety of roadside advertising or the abundance of different types of housing as the coach passes through a number of identified villages. This information can be collated in the evening and related to the latest demographic survey of the area. It might well be found that areas with more advertising or better quality housing have a higher social status (e.g. industrial workers), then those with little or no advertising and temporary shelters (e.g. inshore fishermen).
>
> It has been found best to confine activities to any travelling before lunch, after lunch participants are tired and often have a short nap, prior to the afternoon's activities.

a whole group of participants together is quite easy in a remote prawn farm, but it is especially difficult in busy and bustling places like fish markets where there are many interesting diversions.

If appropriate, following from an initial description and observation of the site, dividing the whole group into sub-groups of 3-5 enables a better and more varied interaction especially if sub-groups are given specific tasks to focus on. At least one trainer should be provided for each subgroup to provide guidance for collection of information, clarification and keeping the participants active during fieldwork. Depending on the field site and language skills of the participants, trainers may have to act as translators. The trainers have to encourage and motivate the participants to record their observations on the provided structured visit sheet. The trainers should also encourage the participants to interact themselves and to discuss using their own knowledge and past experiences in relation to the features of the site. After collecting data from the site, a representative of the group should be asked to present their groups perceptions about the site. This can be done at the site if the environment is comfortable or back in the training room during the evening de-briefing session.

Stakeholder interviews

Stakeholder interviews are an important part of the data gathering exercise. If possible interviews should be organised in an environment familiar to the stakeholder so that s/he can easily illustrate the discussion (i.e. to interview fishermen the team should go to fishermen villages or fish market). The key informant/stakeholder has to be intro-

duced to the participants by the trainer. Any pre-prepared questionnaires have to be asked by a designated group representative. If required, one person from the training should be present during interview to interpret (if the local language is different) and pass on the information to the participants. After completion of the interview a small discussion is useful to clarify, cross reference and strengthen the information collected. Finally, the stakeholder has to be thanked by trainer and the participants.

Teaching tips

Checklist of observation activities to be considered during a field visit;

- The precise location (marked on a provided map).
- Type of Coast (e.g. open coast, estuary, high energy, low energy etc.).
- Types of natural ecosystems, human activities or infrastructure (e.g. mangroves, fishing, loading cargo etc.).
- Feature or processes (e.g. erosion, coastal dunes, coastal defences etc.).
- Sources/ causes of various natural and human activities as drivers.
- Reason why each activity, or piece of infrastructure, occurs there (e.g. coastal defence, ports etc.).
- General statement on contribution of each activity to the economy (i.e. number of jobs created, type of service provided).
- Activities of adjacent areas (to understand the process at a regional scale).
- Any problems caused by each activity, or by adjacent activities.
- Agency which regulates each activity, or controls infrastructures.

Participants should never be allowed to question the opinions, views, beliefs of the stakeholder representative however apparently ludicrous they might seem, or even to offer apparently sensible solutions to problems. If this happens the stakeholder representative can become less open and more defensive. If this looks like happening, the lead trainer must step in immediately. The participants are there solely to absorb information. Further discussion of the stakeholders view can be carried out in the evening, and triangulation and confirmation of the stakeholders' views can be sought from secondary data, the training team's experience, or from further stakeholder interaction.

Time management during fieldwork

The trainer has to be aware of the time available for collection of information at a particular place in the case study site. This has to be communicated to the participants beforehand. However, flexibility must be there if require to optimise the learning opportunities for the participants.

Although detailed timetable for the fieldwork can be quite specific about what happens when, there is a high chance that the schedule will need to be modified due to unforeseen circumstances e.g. traffic accidents, road works. The training team will therefore need to remain flexible and creative in their use of time to accommodate these disruptions without loosing too many learning opportunities.

Briefing and de-briefing

Daily briefing and de-briefing of fieldwork is an important part of establishing a well managed training programme. During the

briefing the onus is on the training team to prepare the participants for the tasks of the day. After completion of the day's fieldwork the participants should present their perceptions about the case study area. In this session, the trainers have to interact with the participants to ensure adequate information has been collected and to clarify the interactions between the components. This will help to identify the interaction among the components of natural and human environment within the coastal zone and to check how the interactions fit into the ICM Interaction Matrix that will be filled in at a later stage in the course.

Briefing and de-briefing of fieldwork should focus on addressing information gaps and clarifying misconceptions. Any completed questionnaires can be collected from participants to evaluate their understanding of ICM concepts.

Evaluating the fieldwork

Evaluation of each field visit is required to improve the arrangements for the next training course. This can be done through a structured questionnaire. Participants should be encouraged to be open-minded and unbiased while evaluating. The components of fieldwork evaluation may include the following:

- Field Briefing.
- Planning.
- Secondary data.
- Field materials.

Teaching tips

Activities that could be part of de-briefing sessions;

- Selection of broad usage categories for the area of coastal zone (e.g. recreation, fishing, transport etc.).
- Listing out all activities observed under the appropriate usage category and indicating how it is related to the coastal zone, e.g. power station (employment, seawater usage for cooling).
- Estimation of the percentage of the coastline occupied by each category. Rank these percentages in descending order.
- Ranking the categories in order of their relative contribution to the coastal economy and physical stability as well.
- Linking each identified activity with its responsible agency and listing them (an Agency may appear in more than one category).
- Identification of the areas of conflict between observed activities in the coastal zone.

- Logistics.
- Time management.
- Resource persons.
- Stakeholder meetings.
- Study area coverage.

Conclusion

Conducting an effective programme of fieldwork in a coastal area that provides a range of learning opportunities for a group of participants is a delicate job that requires considerable pre-planning. Even then not everything is in the control of the training team during fieldwork. Hence, the facilitator has to approach the fieldwork tasks in a flexible manner, so that the fieldwork may be managed sensitively. The successful conduction and completion of the fieldwork thus depends largely on a realistic schedule, good logistics, the expertise of the resource persons in the context of ICM, and the extraction of relevant information from stakeholders. In addition, to increase the probability of success during the fieldwork program, it is necessary that a significant number of trainers are available – either for small group sessions, or for running errands. The trainers can assess the effectiveness of the conduct of the training programme through a proper and brief self-evaluation.

Exercise

These ideas are for use in de-briefing sessions;

Uses and users – In this exercise we will use the case study area to explore the following questions in order to prepare for completing the stakeholder analysis.

- What are the main uses of the coastal zone?
- Who are the main users of the coastal zone (primary, secondary, key)?
- What are the main threats to the identified uses?
- Participants can list the uses against resources in question – major/minor, legal/illegal, conventional/non-conventional etc. – and then the groups and individuals that rely on a particular mix of resources. The threats to uses and users can be added as the knowledge is gained during the fieldwork.

Resource mapping - by the participants with or without stakeholders. Sketch maps can be made of the case study area to document the main components and changes. Historical changes can also be included.

Matrix development – As part of the de-briefing at the end of the day the Matrix tool from the ICM framework could be developed over the duration of the case study. At this stage the components of the natural environment and the changes taking place are useful to incorporate into the matrix.

Handout - Checklist for Important Coastal Components

The **Coastal Environment** can be considered as been made-up from a patchwork Biological, Physical and Human components:
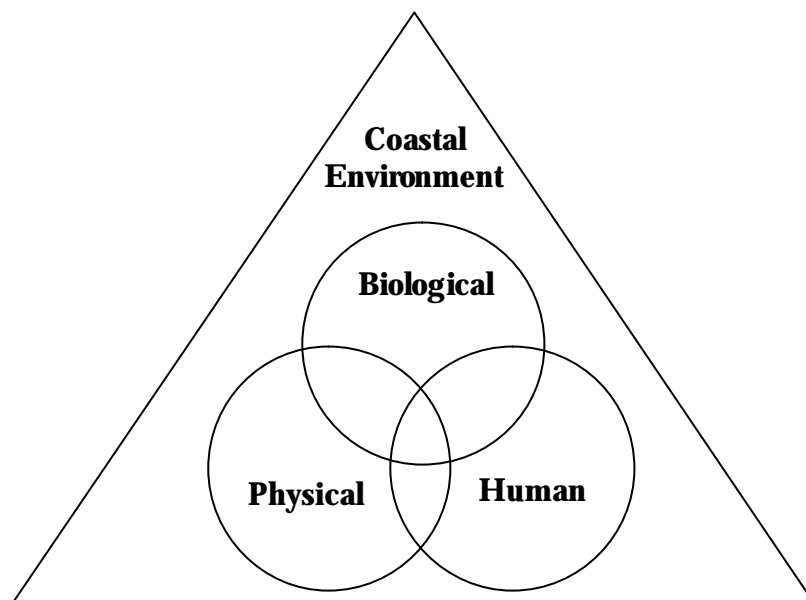
In order to fully describe these components, it may be useful to consider the following:

LAND	AQUATIC	SOCIO-ECONOMIC
Erosion and siltation	Fisheries	Land loss
Backwater effect	Eutrophication	Agriculture
Bank stability	Aquatic weeds	Fishing & Aquaculture
Drainage	Habitats	Land use change
Soil characteristics	Species diversity	Irrigation
Biological resources	Endangered species	Port & Navigation
SURFACE WATER	ATMOSPHERE	Flood control
Regional hydrodynamics	Air pollution	Transport
Silt load	Particulate pollution	Resettlement
Water quality	Noise pollution	Employment
HEALTH	TERRESTRIAL	Trade
Drinking water	Forest	Industries
Nutrition	Wildlife	Education
Sanitation	Species diversity	Resource mobilisation
Diseases	Endangered species	
GROUND WATER	ENERGY & CLIMATE	AESTHETIC
Regional hydrology	Temperature	Landscape
Reservoir Characteristics/Recharge & Water table	Rainfall	Recreation amenities
Salinity	Wind	
Water quality	Wave, Tide & Current	

Module 3: Guideline for Coastal Management Plans Report

Overall Aims for the week

- To provide participants with the tools and experience necessary to develop a plan for an integrated coastal management plan for an identified coastal system.

Learning Outcomes

At the end of this session participants will:

- Have revisited the conceptual framework in the form of an ICM model.

- Have revisited the tools for identifying the significant interactions – the use of the matrix.

- Be aware of the presentation structure for an ICM plan, highlighting the information required.

- Have made an analysis of the case study using the framework.

- Have drafted in groups an ICM plan.

- Have made a group presentation of solution options and possible implementation strategies.

Output

- A course/group report outlining a ICM plan for the case study area.

Module Rationale

The underlying principle to the course structure is that upon completion participants should exhibit an enhanced capability to engage in the ICM process. In the work environment, this capability is shown through the ICM plans that are produced. Therefore, it is appropriate that participants demonstrate their success and achievement in participating in the short course by producing an outline of an ICM plan that reflects the understanding of the interactions between man's activities and the coastal environment they have acquired for the case study area and their ability to analyse the information to address management needs.

To do this the participants utilise the tools that support the ICM training framework (Matrices, Stakeholder Assessment, Assessment of benefits and costs and Risk assessment) that were described during Week One and incorporate the outputs into a report that follows a general structure such as would be adopted for a ICM plan.

Coastal Management Plan Report Structure

The suggested report structure is:

- Introduction: aims and objectives.

- Description of natural and human environment.

- Explanation of the sources of change to identify coastal issues and problems.

- Assessment of the interactions of change on the plan area to arrive at the range of solutions.

- Identification of preferred options.

- Measures to achieve solutions and ensure implementation.

Introduction

This section should address the aims and objectives for the ICM plan that emerge from the ToR that were supplied and any concerns this might produce regarding realization of:

- A sustainable coastal environment.

- Minimising risks to people and property.

- Minimising costs of sustained development.

The aim to minimise costs assumes a functional environment in which self-sustainability is achieved.

The plan aims and objectives could be contrasted with the key land-use patterns observed during the field visits. It should suggest ways in which these interact with the coast and suggest key issues that will need to be considered in selecting a management regime for this coast. This section could also suggest key groups to be consulted and begin to sketch out the basic elements of the salient social and economic factors that will feature in a Coastal Zone planning process. The Introduction should outline what data is currently available and should be consulted. It should indicate where existing data can be found. It should also indicate what additional data might be required and what techniques which might be used to generate it.

Description of natural and human environment

The environment of the area

A description of the characteristics of the plan area in terms of:

- The coastal environment.

- The human environment:

- Land-use: including agriculture, fisheries, aquaculture, conservation areas, recreation areas, quarrying, aggregate extraction, water supply.

- Ports and communications: including port and harbour structures, navigation dredging.

- Industry: including tourism (hotels etc), heavy industry, petrochemicals, power generation, manufacturing, food processing.

- Housing: including rural and urban infrastructures, services (including communications, road, rail and pipelines) and public buildings.

The target scale

The study area to be considered is normally defined around an administrative boundary. The area that needs to be considered in order to arrive at an ICM plan should be described and justified in terms of the scale of the natural and human processes/activities that impact upon the plan area, e.g. sediment cells, economic markets.

Identify change

The objective of this section is to identify and describe change, and define the risks that change brings to the sustainable use of resources and livelihoods of coastal communities. It is useful to distinguish between:

- Changes in the physical environment and the human environment, and

- risks to the human and built environment and the natural coastal environment.

The identification process is carried out through the matrices that should be in-

cluded in the plan. The matrices allow identification of:

- The problem areas - some of which may overlap.
- Approaches to intervention and identification of a range of solutions.

These should be described in terms of their impact on the scale in time and space upon coastal processes and human activities. A consideration of time frames is important for identification of future risks and change that arise from the implementation of different solutions, e.g. rural structures may have a life-span of 50-75 years whilst urban communities may have a life-span of 100-200 years.

The preferred solution

The final solution or solutions will be the outcome of application of the major aims of the study. These are defined above as: Sustainability (i.e. functional integrity); minimising risks; minimising costs. A statement of the preferred solution(s) and its outcomes with reference to these aims should be given and how these were arrived at using risk and the assessment of benefits and costs.

Implementation

Participants should consider barriers to the successful implementation of the preferred solution/s and its sustainable operation. It is important that participants consider implementation as a factor in the formulation of solutions. This section of the report acts as a check that solutions formulated by the participants have been analysed in the context of the wider social, political and economic climate, as well as addressing the environmental concerns relating to issues and problems in the study area.

Exercise

Content of ICM plans

Aims: To provide a forum for discussion of ICM plan content and to exchange ideas and experiences on best practice of plan formulation.

Objectives: At the end of the session participants will have:

1. Discussed and exchanged ideas and experiences of preparation of ICM plans.
2. Identified the diversity of ICM plan styles.
3. Identified best practice guidelines.

How to do it: Give the groups 30 minutes to each prepare a 5 minutes talk to cover the points of the checklist. Wrote notes onto small cards or Post Its – made the table on the wall (checklist point across, delegate down) and then compared and discussed across columns.

Checklist:

- Area and duration that the plan covers.
- Formulation – who, how, why?
- Time frame, cost.
- Structure of plan document.
- Length (pages).
- Expected readership.
- Guidelines for implementation.

References

Some on-line guidelines to approaches for ICM plan development are available at:

http://www.cep.unep.org/pubs/techreports/guidelines/.

http://europa.eu.int/comm/development/publicat/fish/pe039715.pdf.

Examples of some coastal management plans available on the web are:

http://www.chichester.gov.uk/live/conserving_the_built__natural/coastal_management_plan.cfm.

http://www.env.qld.gov.au/environment/coast/management/scmp.html.

http://www.oneocean.org/crm_philippines/process/plan_preparation.html.

http://www.state.ma.us/czm/management plan.pdf.

Chapter 6: Final comments

Although there is an extensive literature on ICM and the role of education in ICM, much of this specifies the detailed discipline and sectoral inputs that might be required during an ICM programme. In contrast, there has been little written that attempts to articulate how the detail from these multiple inputs could be bound together in order to generate holistic and integrated approaches of coastal management, or how capability, and capacity might developed with coastal managers to achieve this. This manual has attempted to address this, and reflection on the previous pages identifies a number of key features that have been developed:

- A training Framework to guide the course structure and the participants through the process of ICM.

- A set of tools which aids decision-making by the participants within the context of the course.

- Guidelines for the development of a training team which can service an ICM Short Course in the required way.

- Indicative contents of an ICM Short Course which simulates the process of ICM within an identified region.

However, the above factors are not enough to provide a cohesive approach to training ICM. Experience by the authors has shown that, for training to have the desired impact, there are a suite of other aspects which need to be addressed. These aspects can confront the very attitude, philosophy and behaviour of the

trainers. Herein lies the conundrum: successful ICM training can only be carried out by experts who can appreciate the relevance and context of their expertise within a broader arena. Consequently, the ToT is a vital component of an ICM training program. It provides training and reflection for experts to be become aware of the relevance and contribution of their subject to ICM. If this is not negotiated and a group consensus achieved, then it is not possible for a training team to successfully train ICM as the course will be biased and conflicting across sectors.

Once a training team has been established, there are a number of features that are required to ensure a successful ICM Short Course:

- Uniformity of approach. The overall picture of ICM must be supplied to maintain orientation in the participants. This was achieved through the use of the ICM Training Framework presented above, however, alternatives might be appropriate in different circumstances.

- Non-sectoral. This vital component is maybe one of the biggest challenges and unless the training team can individually, and as a group, provide a harmonious and balanced input into the training then sectoral-bias will result. In addition, this does not mean that expert knowledge provided from a number of individual sectors will collectively lead to a non-sectoral outlook: this is a common fallacy of ICM training. It is an understanding of the

interplay and friction between sectors that provides a non-sectoral perspective.

- Context rich. It is the relevance of scientific knowledge and information that is important in ICM, rather than knowledge per se. Knowledge must be used as a tool for management, not as management itself.

- Process orientated. A reason for using the case study approach is to provide context, but it also to allow participants to experience the process of ICM. The prime learning outcome of the course for participants should be an increased awareness about the process rather than technical specifics of specific sectors.

- Consensus orientated. Decisions will need to be made through discussion and the formation of group consensus. Within the ICM Short Course simulated management decisions need to be taken, generally and as in real life, this is based on limited or inadequate information; however, decisions still need to be made based on the best information available and methods identified to fill-in gaps: Apparent ignorance should not be an excuse to put off to a later date urgently needed management decisions.

- Real world. The course structure given here attempts to simulate the real world as much as possible, through the use of carefully prepared scenarios and the inclusion of stakeholders from the case study area. Running the ICM course in an academic vacuum will not provide participants with the skills required for ICM when they return to their jobs.

In summary, even when an ICM curriculum has been well designed, it is vital to check that training strategies and trainers abilities can drive the Short Course in a way that will achieve the desired result. In the ICM Short Course, active management should be carried out to ensure that that you are at the successful end of all the axes of the following checklist.

Sectoral	----------	Non-
	----------	sectoral

Knowledge rich	----------	Relevance
	----------	of knowl-
	----------	edge

Technical expertise	----------	Process ori-
	----------	entated

Individually biased	----------	Consensus
	----------	orientated

Academic vacuum	----------	Simulates
	----------	real world

The compilation of this manual was undertaken and facilitated by
Tropical Coastal Management Consultants